Atari Classics

NEW

FOR THE DEDICATED 8-BIT USER

IMPROV

NEW Classics rolls off the press! Finally!
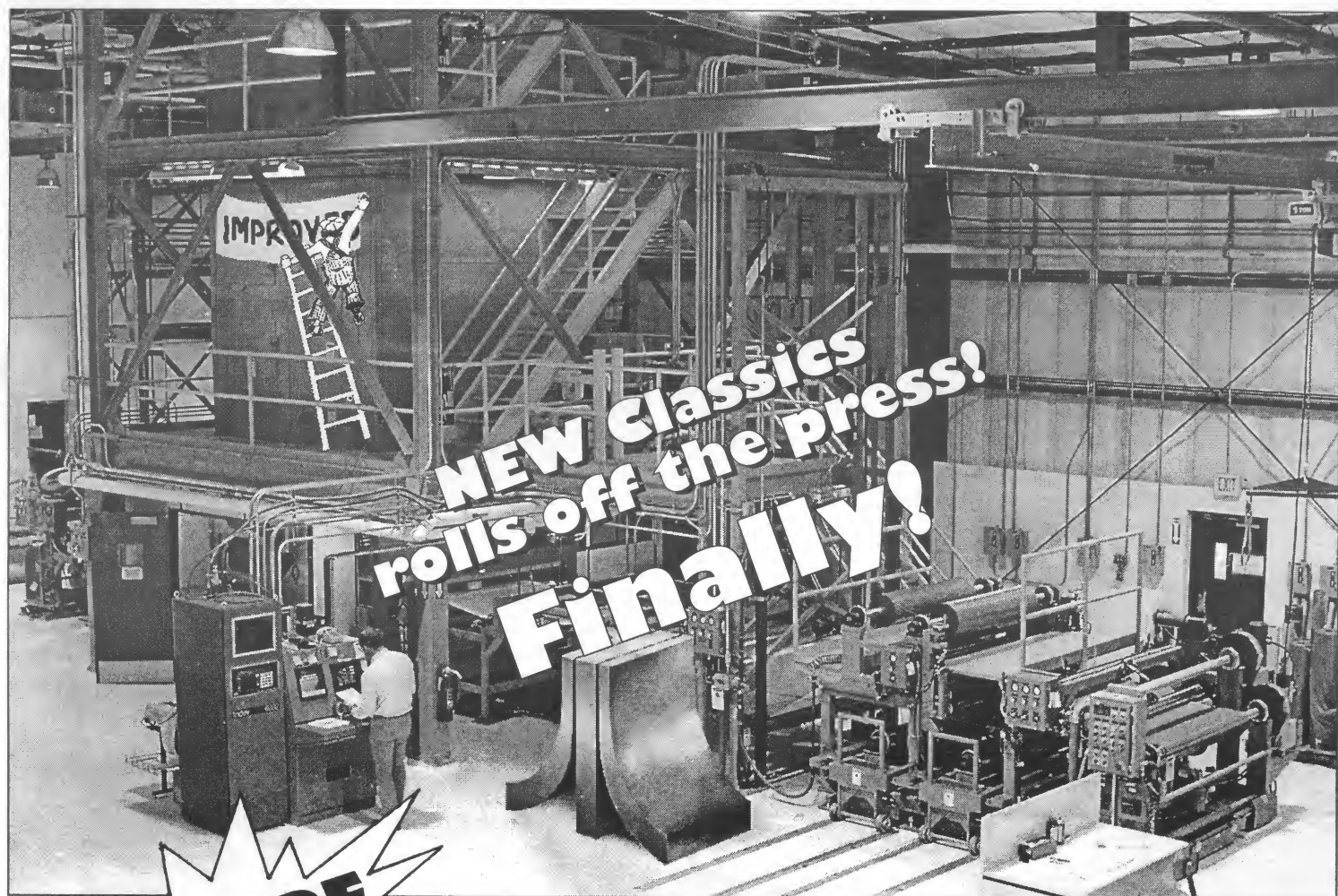
INSIDE

THE REST OF THE MAGAZINE!!

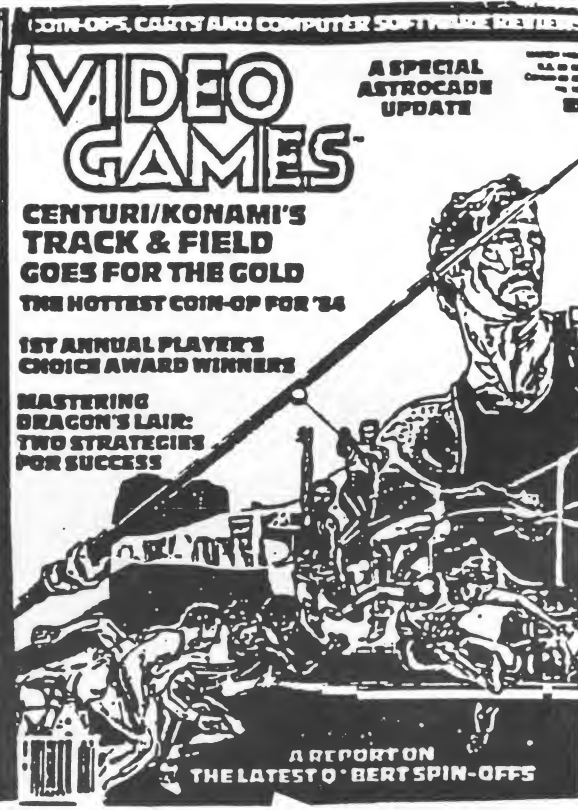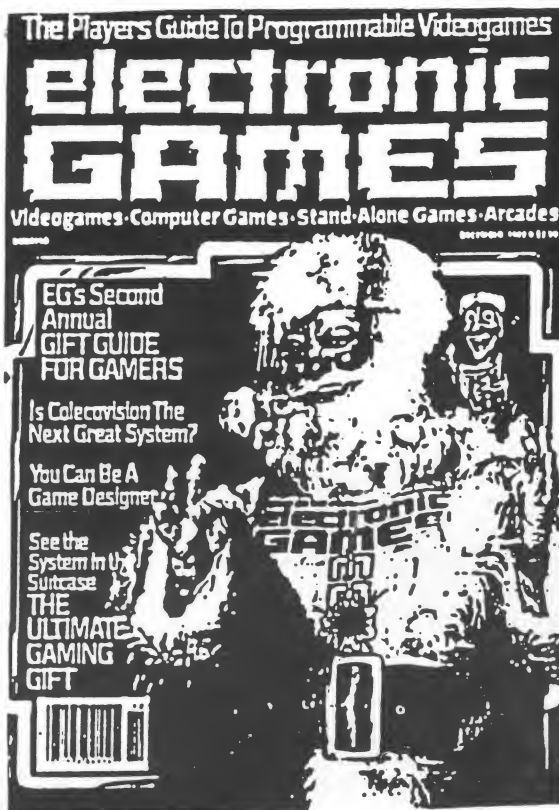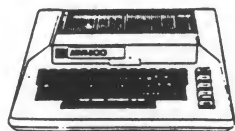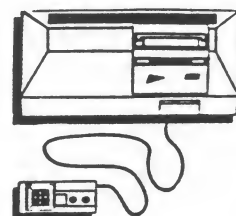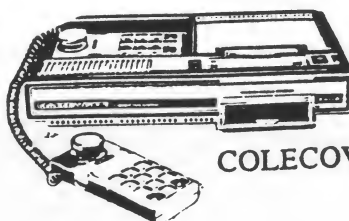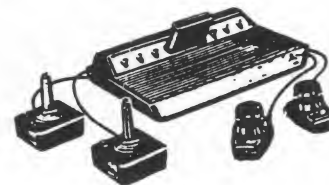# Atari Classics

Volume 3, Number 3
September/October 1994

BACK TO SCHOOL ISSUE

Communications

Help! 1

Do you know where I could purchase the following programs:

YEMACYB

This product allows you to print color hard copy, using a compatible black and white printer.

PS LQ-500/800 DRIVER

Makes Print Shop compatible with the newer Epson compatible 24 pin printers.

Lawrence Moon

Thanks & By The Way

Thanks for keeping the dream alive!

Clay Halliwell
PS—Hope you keep using my DOMMenu on the software disk. (hint - hint).

ATESIG

This is the Atari 8-Bit SIG for Model Railroading and was founded in 1989. We are mainly model railroaders who happen to have a few 8-Bits.

Dues are $10.00 per year payable by check made out to Decker G. McAllister, Jr.. Dues cover annual membership and four issues of the newsletter which usually runs 12 to 20 pages.

We recently started a series on the use of LOGIC ICs.

Our top priority is the development of an interface which will allow us to control many trains at the same time. The engines will be equipped with either commercial or ATESIG digital receiver / decoder / throttles.

Our October 1990 newsletter contained the schematics, parts list and description for a simple game port throttle.

Include a LSSAE with two first class stamps to receive the dues form, system information sheets to fill out and return, and four page catalog/form.

Decker G. McAllister, Jr.
ATESIG Coordinator

Help! 2

I am looking for an 8-bit program that will draw a control chart. And one that will draw the standard bell shaped curve for data. Several programs that I have will do the calculations but none of them will draw the graphs.

Harry…[I lost last name. ed.]

Need Articles?

I hear from Ben Poehland that you are looking for people to write articles. I'd be happy to write for you once in awhile. I would like to know if you have any restrictions as to length or preferences for subjects.

Thomas Andrews

Yes, we would love to have submissions from you and anyone else that is interested.

No restrictions on length. Authors of feature articles printed in the magazine receive a token payment of $25.00.

"What is a feature article?" you might ask. It's kinda vague, but articles running over two magazine pages would probably qualify.

We hope to print a variety of articles of interest to beginning users through old hackers.

We would like disk or e-mail submissions, so that we don't have to retype things. As you can tell from the long wait for this issue, I'm too slow as

it is, so don't make me type, if you can help it. We can be contacted through the Postal Service or on GEnie at J.HOOD9.

Let us hear from you.

Do You Take Visa?

I received not too long ago the final issue of AC (old) and saw that you intended to continue the effort. I am very interested in taking a subscription out because the old AC mag was excellent. The best way for me to subscribe is by Visa. Do you accept this form of payment.

Peter Geraghty

Yes, we do. We don't have a Visa or MasterCard account of our own for processing pyments, but ATY, an Oakland, CA, ST dealer, has agreed to process them for us.

Because of the the extra effort involved in this, we prefer checks, international postal money orders and stuff like that, but if Visa works best for you, okay.

I Want...

I'm looking for a RAT or RODENT from Zorian Industries, with software, for a 130XE.

If you can be of help, please call.

(305)792-1942

For Sale

Amdek color monitor; Atari 1050 disk drive, data management system program, Atari weekly planner.

Still boxed—never used.
Serious buyers only.
Leave message at (610)868-7696.

Kenneth J Huber
Operatins Manager

BEN POEHLAND'S

August 10, 1994

It pleases me greatly to report that the issuing of refunds to all former subscribers to the old AC is now essentially complete, and as of this date the original publication may be considered officially terminated.

I wish to officially announce my departure from the AC Staff, and hereby declare my resignation therefrom in the positions I occupied, Managing Editor and Circulation Editor.

The status of refunds at this time is as follows:

1. A batch of 88 refund checks, representing the last of the American refunds and all of the Canadian refunds, was posted on August 9 and should be in the hands of their intended recipients shortly.

2. A batch of 18 IPMOs and bank drafts, representing refunds to overseas subscribers, was posted today. The IPMOs will take a few weeks for postal processing before final delivery.

3. Unicorn Publications is presently working up 17 credit card refunds to overseas subscribers. Notices of account credits will be mailed out shortly by Unicorn Publications from Ann Arbor, Michigan.

All together, 351 refunds have been/are being issued. The refund policy as announced in the April AC was followed very nearly as given, except in the case of Australian refunds. One Australian refund was denied and the remainder made by bank draft, in consequence of the discovery that IPMOs are not available to Australia.

The entire stock of back issues of the old AC has been transferred to the magazine's new management in California, including back issues of the AC Software Disk. I will no longer respond to inquiries concerning back issues or subscriptions to AC. Individuals desiring such information about the new AC should contact:

ATARI CLASSICS
5507 Langford Court
Concord, CA 94521

A number of people have asked what role I will play in the new AC. I've made myself available to the new management in a consulting/support capacity over the past six months and expect to continue in that role for as long as they desire my services. Many people have begged me to continue my "Alchemist" column in the new AC, but regrettably circumstances will not permit me to make contributions of that nature in the forseeable future.

In consequence of unprecedented instability now sweeping the U.S. pharmaceutical industry in the wake of political turmoil surrounding the Clinton national health plan proposals, many scientists in that industry are experiencing the loss of their jobs and wreckage of their careers. I am one of them. In June the department where I

worked for 13 years was abolished, and I became unemployed. A few weeks later I received news that my mother has been diagnosed with terminal cancer. In a few days I'll be leaving for an extended visit to Mesa, Arizona to attend my mother's needs. I trust the 8-bit community will forgive me for placing these serious concerns far above any continued participation in Atari magazines. However, I anticipate being an 8-bit user for quite some time to come, and of course I'm a charter subscriber to the new AC.

The slow pace of refunds over the summer on the part of Unicorn Publications initially hobbled the efforts of our California colleagues to restart the magazine. Many loyal readers apparently held off subscribing to the new AC until they had received their refund from the old AC. By encouraging Unicorn to complete the refund process in a timely manner I expect to see a corresponding boost in support for the new AC in the weeks ahead. Feedback I've received from readers in response to the refund program has consisted mainly of expressions of astonishment that the policies stated in the April issue were actually followed and people had a cash refund

Final Farewell...

in hand from an Atari magazine for the first time in the history of Atari computers. I'm very proud of the legacy AC established in dealing "up-front" with its loyal supporters and hope the new management will continue the tradition.

I don't have any real figures for the present level of support for the new AC, but reasonable estimates place it at around 200 paid subscriptions. Based on my experience I believe the revived publication will probably top out with a subscriber base in the range of 300-350.

Unpublished manuscripts remaining in my hands were turned over to the new management following their promise to continue the same policies toward author compensation that I originally established. Recently they've begun recruiting a staff, and I'm pleased to report many of the former AC Staff will be serving the new publisher.

They've also made local arrangements that will permit them to print the new AC far more cheaply than Unicorn did, which means they'll be able to survive financially with a smaller subscriber base. All indications point to a revival of AC very soon, I would guess September but must admit that's purely speculative.

Finally, many people have questioned why it was necessary to shut down AC and start it up anew instead of just having the old publisher turn over operations to the new. First, I must point out that plans to shut down AC had already been laid in January 1994, well before Bob Woolley became actively involved in saving the magazine and securing a new publisher. Once things began to roll it was too late to stop the

process; the best I could do was extend support to the new effort. Second, back in February no one knew what level of support a revived AC might attain. Staff morale was extremely low due to the sharp falloff in renewals in Dec.'93/Jan.'94, and even Bob Woolley and Jim Hood were concerned there might not be enough support to warrant their continuing the effort. The whole period of January-May 1994 was fraught with unknowns, anxiety, chaos, and instability — punctuated by power blackouts and disruptions caused by the Killer Winter of '94 (which left me with $2,000 in property damage and a huge mess to clean up). For Unicorn to turn over AC to an unknown third party in such a climate would have been an act of catastrophic stupidity. Due to the uncertainty of future support, Bob Woolley and I mutually agreed any continuation of AC would have to be an independent effort. And finally, neither the Staff nor Publisher of AC had the authority to transfer the magazine's operations even under ideal conditions. Had AC been threatened by some external event (for example, the collapse of its publisher), it would have been within the scope of my authority to transfer the operation elsewhere. But instead, AC was threatened by a failure of support from the very community that brought it into existence. In conferring with Jeff McWilliams (de facto representative of the 615 people whose response to the mail campaign of 1992 authorized him to ask me to start the magazine), we agreed that in view of the situation the correct response was to "give AC back" to the community that authorized its existence. The only way to do that was

to release the Staff back to the community and distribute the magazine's financial resources back to the community. We have in effect given AC back to the community from whence it sprang, in consequence of the community's failure to support the original mandate.

People should bear in mind that the revival of AC in California is totally independent of the original AC. All the support given by elements of the old publication to the new have been at a purely personal level, none of it official. For the past eight months I've walked a fine line between strict adherence to the original proposals upon which AC was founded and my own personal desire to see the AC Experiment live on. Through the intervention of Bob Woolley and a mutual spirit of informal cooperation between elements of the old and new publications, I believe I can at last claim success on both accounts. We have been through a trial by fire, from whence a new AC will arise as a Phoenix from the flames.

For some of you, the refund you receive(d) is merely a check, to be cashed and spent. But for others — those of you still capable of dreaming — that refund check is a ticket to be used to vote yet a second time to continue what still stands as one of the most unique events in the history of personal computers.

I hope people will realize the extraordinary effort that has gone into giving the community a second chance to vote, and that you will do so wisely.

Respectfully submitted,

Benjamin L. Poehland

ALMOST

September 11, 1994

During the past 10 days I have received a rising tide of complaints and inquiries regarding dishonored checks issued by Unicorn publications and mailed by me, in conjunction with the refund policy described in the April 1994 issue of *Atari Classics* magazine.

In view of the increasing seriousness of the matter I feel compelled to quell any rumors spreading on the networks by presenting the facts as I know them.

Of approximately 350 refunds issued, I believe the great majority have been paid. At this time it is my impression that fewer than 50 subscribers are affected by the problem.

In the following text, "Unicorn Publications" collectively refers to both William R. Rayl and Patricia L. Snyder-Rayl.

The facts of the matter and the status of the situation are as follows:

1.) During the period August 22–September 9, 1994, funds in Unicorn's account were drawn down below viability at least twice, for unknown periods of time in each case. During these periods an unknown number of items were dishonored by their bank. I am aware of six incidences of fees levied by banks on refund recipients due to NSF checks, plus an additional five cases of checks being deliberately witheld from presentation due to fears they would not be honored. I estimate the total number of individuals affected by bad checks could exceed twenty.

2.) Unicorn apparently wrote checks with abandon and failed to keep competent records, even though they were in possession of exact information as to the balance of funds on hand as well as the total cost of refund payments to be issued.

3.) At this time, the account is again viable and I urge all recipients still holding checks to negotiate them at once. Funds from uncashed checks will end up as your gift to Unicorn. Before processing a refund check, ask your bank to verify availability of funds in Unicorn's account to prevent charges from a bounced check.

4.) Despite my requests, Unicorn has failed to account for eighteen refunds which were to have been handled by them personally, as they had to be processed through credit cards. If you paid your subscription with a credit card and have not received your refund, check with your card company about what action to take.

5.) A Certified Notice was mailed to Unicorn on September 8 informing them of potential criminal liability and advising them of steps to be taken if they wish to avoid felony prosecution. A dead-line of September 30 was set for them to resolve all complaints, including complaints for charges incurred from dishonored checks that were subsequently paid when presented a second or third time.

6.) A complaint was filed with the Ann Arbor Police Department on September 9, and a preliminary investigation is in progress.

7.) I am presently awaiting arrival of complaint forms from the Office of the U.S. Postal Inspector.

If Unicorn dishonors the Sept. 30 deadline, a felony complaint of Postal Fraud will be filed. Recipients outside the U.S. would have to file a complaint with their national postal service, which would likely turn it over to U.S. postal authorities.

8.) Some people have blamed me personally for the bad checks. I wish to make it clear that I never at any time bore any responsibility or authority for financial management of AC's funds. That was entirely Unicorn's responsibility. They bulk-mailed the checks to me, and I served merely as their agent in sending them to individual subscribers. I had no idea which checks were good and which were bad. This has placed me in an extremely compromising

position. Not to mention, I too was nailed with charges from my own bank due to a bad check they passed to me. I officially resigned from AC on August 10, 1994. I am as much a victim — if not more so — as the people who have complained to me.

9.) Unicorn Publications (T/A Pegasus Press) may be contacted by e-mail as follows:

On CompuServe at **70007.4640**, or via Internet to Compuserve at **70007.4640@compuserve.com**. On GEnie at: **CONNECT.MAG** or via Internet to GEnie at **connect.mag@genie.geis.com**.

They may also be reached by voice at: **1-313-973-8825**. Ask for Bill Rayl.

Send written complaints to:
**Unicorn Publications
3487 Braeburn Circle
Ann Arbor MI 48108.**

Readers who wish to verify fund availability may call Bank 1 in Ypsilanti MI at: 1-313-434-7314. Ask for Gail Thompson. Or call the branch number at: 1-313-572-7800.

The number for the Washtenaw County prosecuting attorney's office is: 1-313-994-2380. The number for the Ann Arbor Police Department is: 1-313-994-2661.

10.) A reader in Florida, Vern McColloch, is considering a possible class-action civil lawsuit to recover damages. He may be contacted at 1-305-792-1942 or in writing at:

3721 S.W. 59th Terrace #5
Davie FL 33314- 2643.

11.) A few recipients forwarded their refund payments to AC's new publisher, Jim Hood. Jim is aware of the Unicorn problem and held up processing one check.

12.) During the latter half of August I was in Arizona attending the personal needs of my mother. I only became aware of the problems with refund checks during the first week of September after I returned home and caught up on my mail. This totally inexcusable situation thus hit me at a particularly difficult time.

In their communications to me on the subject, Unicorn has failed to express any personal culpability for creating the problem or any remorse or regret for the distress they have visited upon so many people.

Benjamin L. Poehland

My daughter is starting her first teaching assignment this month. After four years at college, one year in a credential program, and one year substituting, she is on her own with 20 fourth and fifth graders. Naturally, Mom and Dad went up to visit the new house and the classroom. Nice place, that school. Getting a face lift, new carpets, A/V equipment, and computers in each room. Computers? Yep. Each teacher has two IBM XTs with hard drives and monochrome screens. Oh, boy... Well, at least they have their own systems to do with whatever they want. So I asked the teacher (in school, she is the teacher — at home, she is the daughter) what she was going to do with the computers. "Get some kind of word processor for the kids to use" was the reply. And maybe some educational stuff, also... Somehow, the impression seems to be that the software content is the operative part of "Learning Computers". No lesson plan was developed for the XTs. Worse yet, only one hour per week is allocated to computer time. Considering that the teacher is fresh out of an educational process which should have provided her with the latest tools and techniques and the teacher grew up in a house full of computers, I was underwhelmed. Not too surprised, though. Society is changing rapidly and the education-al processes don't seem to be able to stay up with the changes.

Of course, the first issue that surfaces when discussing computer education is "Why?". The debate then wanders off into the woods labelled "everybody doesn't need to know about computers, just the computer types. I don't need to know how to design (build, fix, take apart... you pick) a car in order to drive one!". Well, if everyone was as poorly prepared for driving a car as they are for using a computer, the highways would be a lot less crowded (and more dangerous). There is no question that the vast majority of children in our school system today will be computer USERS in their adult life. Not programmers, not engineers, just users — at home, at work, at play, everywhere. The computer is a tool that they will have to deal with, prepared or not. Adults currently live productive lives not being able to read well, do fractions, or make informed social decisions. Should we not teach reading, arithmetic and social studies? What is education for, anyway?

If we look at the role education played throughout time, it is clear that there now exists a special problem. Take Og, the caveman. His simple education consisted of learning by example. One of his older brothers or his father would take him along on expeditions and hunts to show him the techniques of game tracking, tool making and other necessary tasks of primitive life. Verbal communications were minimal at this time and what little new information was developed during Og's own lifetime would not affect his current lifestyle, even if it could be communicated to him. Progress was understandably slow.

By the time Rolf, the medieval serf, was born some 500,000 years later, languages assisted in the transfer of knowledge, but Rolf's early education would still serve him throughout his life. His classroom may have been a little more structured — he may have been in a formal apprentice program, but it was still generally passing knowledge from one person to another directly. Discoveries of the nature of gravity, the planets and such things would still not affect his current lifestyle. Not only would Rolf be unaware of any such discovery, but it really had no bearing in the life of a barrel or candlestick maker.

As time marched on, written communication became an important factor in speeding up progress. Printing technology made books commonplace. Reading and writing slowly became mandatory, even for the average person, as we advanced into the 1800s. This was an impor-

Computer Education
Bob Woolley

tant turning point in education — reading and writing are not necessary for most labor intensive jobs. They are, in themselves, just tools. They give the master of these disciplines the ability to communicate and learn from others. A farmer or factory worker could get along just fine in his craft without these skills, but the educational process recognized the concept of an "educated man" as opposed to a trained apprentice.

Now, in the closing decade of the twentieth century, we find another turning point in the educational process. There is the new phenomenon I will refer to as "static cultural shock" during a individual's lifetime. Let me explain that a little bit. The pace of technological advance has increased to such an extent that the information transferred during the educational process to a youngster (his primary school education) will not be sufficient to provide him with adequate tools over his expected life span. Cultural shock can occur when an individual from one culture is physically transferred to another. An adult facing this type of cultural shock often is lost and disabled. His primary education has not prepared him for th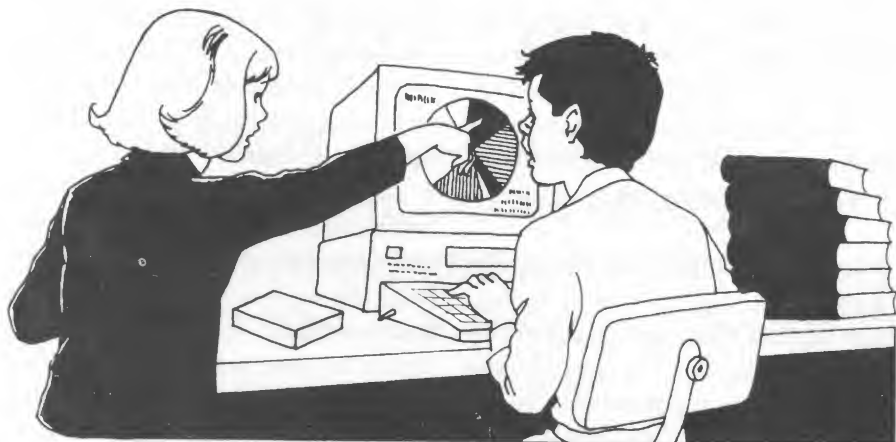e challenges of his new environment since they didn't exist in his childhood. Static cultural shock does not require the individual to move at all. Society and technology sweep past him in a blur and again, he becomes lost and disabled.

Of course, individuals facing either type of cultural shock can learn the new processes and skills required to be a productive member of society. In the early 1900s, these challenges were easily manageable. They took the form of telephones, radio, and automobiles which were relatively easy to master (although most families had an "Aunt Helen" who never quite learned how to drive). A 40 year old novice could master a telephone with little assistance, and a child who grew up with a telephone required no formal training whatsoever. Some of these advances carried subtle costs which were magnified where poor understanding persisted. Electricity is one example of this — people to this day are killed by electricity because they don't have a basic understanding of it's nature. Automobile accidents prompted the inclusion of driver training directly into the secondary school curriculum as well as numerous safety related programs in the primary grades (a key point — every educator drives an automobile). Continued use of these new products brought increased understanding and utility (another key point — these innovations have not really changed since they were introduced into society. A 1923 Ford still uses foot pedals, an accelerator, and a steering wheel just like a 1994 Ford. We still drive on the right side of the road). Computers, on the other hand, do not lend themselves to intuitive operation or self-enlightenment.

I spend a lot of time helping people do things on their IBM computers even though I am really an Atari guy. Doesn't matter to them. I still know something, which is more than they know. You see, these older (over 30) folks didn't grow up with personal computers — they weren't invented until 1975 or so. The only computer literate members of their generation are those of us who became fascinated by these little machines and spent long hours learning about them. So, will the children of the computer era have an advantage over their non-literate parents? Doesn't look like it, folks. Suppose your parents couldn't read or own any books. Think you would learn to read? If they had no car and didn't drive? Where would you learn these things? In school, of course. From teachers, who can read and drive, in a school that owns books and vehicles.

What is changing in our society so rapidly? Computers and their applications. Go to any office and you will see bunches of the little devils. What is the main challenge in computer applications? The person with the need doesn't know computers and the person who knows computers doesn't understand the need. I know computers. I don't know art or music. Can I help an artist or musician who doesn't know computers with his application? Not

very well. Can I help an insurance salesman manage his business? Not very well. I can develop processes for my own applications, but without learning a user's needs, I can't help them with theirs. What is needed is for the user to learn computers themselves. This is hard...

Computers are not easy to comprehend. Reading isn't easy either, but it is such a valuable tool everyone has agreed to spend the effort to teach reading in school to every student. This commitment to reading (and writing) was made over generations of experience. Reading was a clerical art for hundreds of years, but slowly, the general population developed a need for reading as a communications tool. The educational institutions were one of the first to be 100% literate and it is now accepted as a necessity. Computers, on the other hand, didn't develop over

many generations — they exploded on society in less than one! Not only is there no consensus of their value in the general population, but the primary educational institutions aren't even literate. This is not good. You already can't function in business without computer skills of some sort. Computers will be necessary in day-to-day life in increasing frequency regardless of our educational policy. People can still get along as illiterates, and non-drivers, but only with difficulty. The same holds for computers...

So, why don't we adopt a comprehensive and effective computer education curriculum in our schools so that future generations will have the basic skills they will need to be productive members of society? Well,,, we don't have a plan... We can't agree on the form or function of such a program. We don't have

enough educators familiar with computers to generate support for a program. We don't have a general population of users who can lobby for a plan. Most important — we don't have the money to fund implementation of such a plan. Nobody to pay for a car, nobody to drive it and no place to go in it.

Sounds kind of hopeless, doesn't it? Am I writing all this just to point out the problem? No — I think there is a solution. More specifically, there is a direction that we need to move in to get started on the solution. We have to minimize the costs of such a program. We also need to allocate more time in the school day to the computer and integrate it into the educational process itself. Reading, writing and arithmetic should be taught on a computer when it is more effective

to do so. If one thing hasn't improved in the educational system over the years, it's the efficiency of the teacher. One teacher, 30 kids. No productivity increase at all in the last 50 years. If we built cars like that, they would cost $50,000 each by now! We need to teach computer concepts to the kids, not software. Learning WordPerfect 5.2 under DOS is of little value to someone when it will be obsolete by the time they actually get in an office to use it. The teachers themselves must not only be computer literate, but they must understand the underlying processes in the computer... All of these avenues should be pursued, but you must start with costs or you won't get anywhere.

How do we minimize costs? Let's look at what costs are made of...

The cost of software: In a project of this magnitude, software should be developed in house or under contract for use in all schools. There is no need to use industry standard software. In fact, the use of commercial software is a major operational problem. Updates for such programs are produced according to market forces related to business needs, not educational utility. Features are designed into such products at a cost to every user that will have no classroom value. In addition, the advantage accrued to an educational supplier in the marketplace (everyone learns Lotus in school...) would cause tremendous marketing and political pressures for the school systems. It will also be necessary for all schools to adopt the same software in order to benefit from economies of scale and to provide transferring students continuity. Bottom line: schools as a group should develop their own generic software that will be universally adopted.
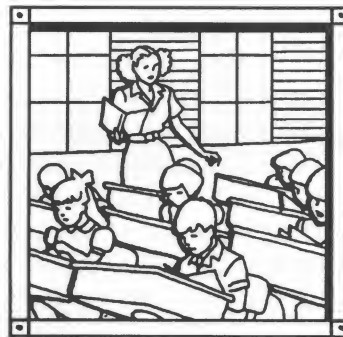
Hardware costs: The cost of hardware is dependent on the useful life of the unit and it's capabilities. As in the case of software, the schools need to design their own proprietary hardware, much for the same reasons. The memory and processing requirements for a universal educational system need not be more than 1 megabyte on a 5 MIPS processor and, with the exception of the keyboard, the system should last a generation. Since the schools control both the hardware and software, they can be optimized for least cost and highest utility independent of market forces in the commercial world. Hundreds of thousands of identical systems would lead to highly integrated and lowest cost implementations.

Teaching material costs: The last requirement is for books, lesson plans and manuals for all these systems. This is another area where it has to be home grown. Since this is a custom design, you get to write the books, too.

Sounds easy, doesn't it? Well, maybe not too easy... Let's simplify it some. The hard part is getting started — lots of politics on specifications – lots of research and development costs – lots of time to get it done — why not just buy something already done? The whole banana... Hardware, software, and teaching materials. Buy the Atari 8-bits! Buy the technology and rights from Atari. Buy all the software licenses you can find. Buy all the publishing rights you can find. (Kids and the Atari is a great book!) Buy the 65816 from WDC. Get the DOS, the OS, everything! That would cost you almost nothing and it's all done for you. Sure, you would upgrade and refine the systems hardware and software, but it would be a good starting point for the time

being. The 8-bits are very simple compared to a newer system. They would be dirt cheap to manufacture in quantity and they lend themselves well to upgrades. The 65816 has plenty of power at higher clock speeds and has a very small die size (making it cheap to manufacture). Compared to an XT with a monochrome screen, the Atari has color, sound and software more appropriate for an educational mission. To be fair, the C64 and Apple II could also be candidates for a bootstrap system since they both have no commercial value with well developed hardware and software, but this is an *Atari Classics* article....

I can't imagine any other path to take that would result in the kids of today learning what is on a diskette, how a computer is programmed, I/O basics and system architecture in their classroom. These are the tools they will need to really use a computer in their life. Like the three Rs, it gets more difficult as you get older — kids need to learn it early in life or do without. They certainly won't learn it on an IBM XT from an untrained teacher who spends an hour per week on the computer with the kids. The program certainly won't be developed by educators who have not learned those skills themselves. A public that understands nothing about computers will not petition for a new educational process. I guess that just leaves us computer types...

Dollars and Sense in Education
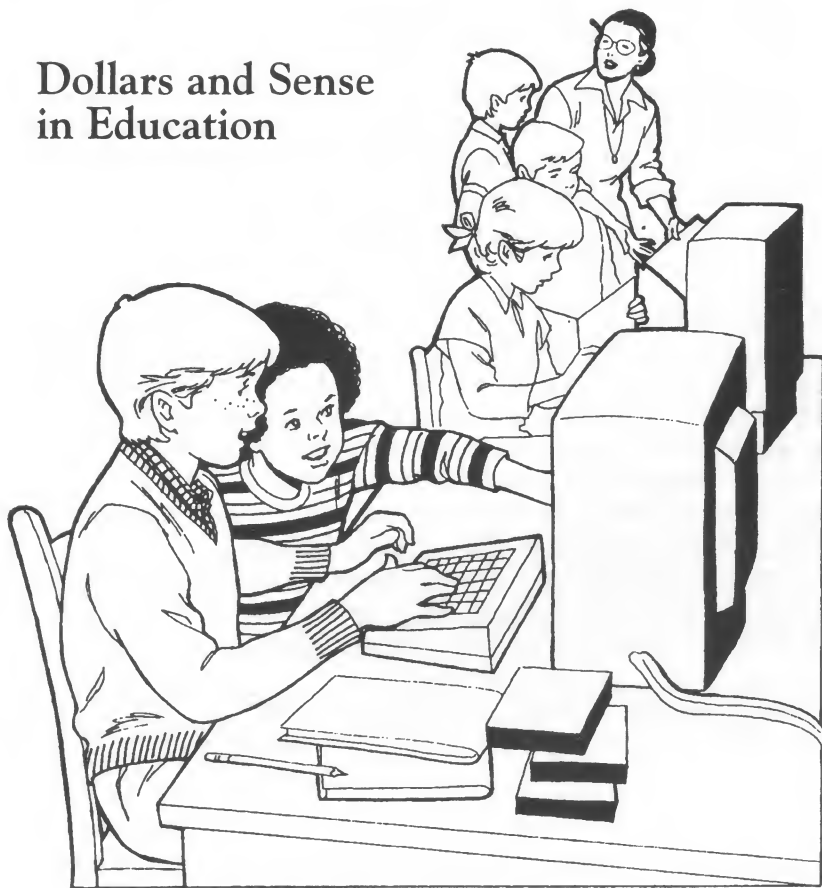
Atari Eight-Bits In The Classroom

Barton M. Bresnik

I'm a teacher who uses computers in the classroom in an integ rated curriculum. Computers are used in all subjects. For a report on malaria written in AtariWriter Plus and illustrated using Atari Paint, a student may receive grades in social studies, science and communications (we called that English). Atari eight-bit computers are used because I can buy 'em in flea markets or from GEnie ads, or they're donated to our class; they perform reliably; they're easy to use and they can do almost anything needed. It's appropriate technology. Sure, we could use a PC, Mac, Falcon 030 or even a Sun workstation or two, but for the price of one MacIntosh, we've got a dozen 800XL's and their kindred.

In the past months, I've received requests for a list of general-purpose educational software for eight-bit Atari computers. Offered here is a somewhat limited, idiosyncratic list of the educational software my students and I prefer to use.

1) The software mentioned has been tested mostly in the middle school.
2) There are many excellent programs not mentioned because of my limited experience.
3) Though the address of a software publisher has been listed here when known, it is primarily of historical significance, as *most of these publishers no longer support classic Ataris or have closed.* However, if you look through the ads from companies such as American Techna-Vision or B&C Computervisions, watch the classified ads in *Atari Classics*, shop at computer flea markets, or attend Atari user group meetings, much software may be found.

Communications:

Among the most-used programs are word processors. **AtariWriter** (cartridge) and **AtariWriter Plus** (AW+)(disk) from Atari are not WYSIWYG and are limited to 40 columns across the screen (though AW+ may show a "window" into a much larger virtual display) but they are my favorites. They are robust, easy to learn and keep pace with rapid typing even in "insert" mode (better than many PC programs). The screen is much more legible than 80-column NTSC displays, especially on color monitors. Other word processors I've used are **Speed-Script** v. 3.0 from *COMPUTE!* magazine and **T:Edit** from the May, 1987 issue of *A.N.A.L.O.G. Computing*. Both are capable of fine output and are useful when compiling 'C' programs, but are not as versatile as AW+. These programs have been released from copyright and may be accessed from the GEnie eight-bit libraries.

Minimalist desk-top publishing is available using **The Newsroom** (disk) from Springboard. **Award-Ware**, **Print Power** and **Sesame Street Print Kit** (disks), produced by Hi Tech Expressions, allow the production of banners, posters,

awards and cards. Two drives are recommended for DTP to avoid continually swapping disks. All these programs produce quite good, if somewhat "dotty", results from my XMM801 printer, but are much slower to use and to print than are word processors, because of all the personal decisions to be made and computer rendering time in producing graphic details. Print Shop from Broderbund also has a fine reputation for DTP, though I've not used it.

Other programs for "keyboarding" use are **Lazer-Type** (disk) by Matt Rattcliff and **Master-Type** (cart.) from Scarborough Systems, Inc. Both are timed typing drills, but Master-Type also allows the inclusion of your own vocabulary list (in any language, of course) saved to disk, so that spelling as well as keyboarding are learned. **Word-Search Maker** (disk), by the author, generates puzzles which may be copied and distributed to other students, who define the words as well as find them.

While on the subject of language, **Skywriter** (cart.) by Atari teaches the building of compound words, such as *underground* through an animated game. It's fairly popular with my students. **Spell Diver** (disk) by Scholastic, Inc. is one of those captivating games that surreptitiously has the student practicing spelling while "diving for pearls". Elementary grade students love it.

Music:

An immense variety of music programs are available. **AtariMusic I & II** (disks) from Atari help one learn, respectively, musical notation and the major scales and keys. The four-voice ability of the Atari sound chip is used well, as are graphics. A few learning games make it fairly enjoyable. **Music Composer** (cart.)

from Atari aids in the production of an actual musical composition as well as learning and understanding an existing tune. A nice feature is the use of repeats to allow extended compositions. My students have used Music Composer to make a simple background sound-track for a video they produced. **The Music Studio** (disk) from Activision, **Bank Street Music Writer** (disk) by Glen Clancy of Mindscape, and Will Harvey's **Musical Construction Set** (disk) from Electronic Arts bring the convenience of cut-and-paste word processing to musical composition. These elegant programs allow you to print the score if you have one of the compatible printers. This is pretty impressive, as until quite recently, musical scores were true manuscripts, photoreproduced. The Music Studio is also available in an Atari ST version, with MIDI capabilities.

Movie Musical Madness (cart.), **Halftime Battlin' Bands** (cart.) and **Coconotes** (cart.) from CBS Software are "interactive musical activities" which aid children in sequencing as well as in recognizing music. Users piece together musical segments in Battlin' Bands; in Coconotes they place individual notes in a score; and in Movie Musical Madness set the stage, direct the action and select a score to produce a brief "movie". All three are captivating; it is particularly difficult to interrupt a student production of Movie Musical Madness.

Visual Arts

Art programs abound and are among the most popular programs in school. **MicroIllustrator** (disk or cart.) from Island Graphics Corp. and **AtariArtist** (cart.) from Atari are almost identical; pictures made by one can be loaded by the other. Both may be used with touch tab-

lets, but the Atari Touch Tablet from Atari is purposely designed to be incompatible with the Koala Pad from Koala Technology Corp. (motion on one axis is inverted). It should be possible to re-wire one tablet to emulate the other. Atari Artist allows the use of keyboard access to commands, which I find somewhat more convenient, but both produce excellent results. GEnie and other BBS's have free or shareware programs to print screens in MI format to color or black-and-white printers and to allow MI pictures to be loaded as part of a BASIC program.

Epyx produced **Fun With Art** (cart.), which allows more than five colors on-screen by means of display-list interrupts. It also features cut-and-paste and copying of blocks of art: draw one tree, copy it to make a forest, then "touch up" to individualize a few trees. I prefer FWA for detailed drawings which will later be loaded into a BASIC program, such as **Ecologian**. Please note that the routine they've given for loading these pictures has an error, which will eventually cause a program crash. To fix this, change all three lines that read:
```
A=USR(ADR(CIO$),16)
```
to read instead:
```
A=USR(ADR(CIO$))
```
to prevent eventual stack overflow.

Atari Paint (disk) from Atari (apparently there are different programs with that title; the one I've used is DX-5048) allows even very young children with poor motor control to make nice low-resolution pictures using the joystick. Like FWA, Paint has adjustable response speed to stick input.

Computer Crayons (disk) from Futurehouse is aimed at the early elementary grades. It allows students to color-fill line drawings and to then observe various animations and

tunes. Each drawing is associated with a letter of the alphabet. This still captivates my eighth-graders (though hopefully, they already know the Roman alphabet).

There are too many other fine art programs to list all, but I will mention a few. **Magic Paint** (disk) from GEnie is a *tour de force* demonstration of TurboBASIC. As such, it may be modified by an experienced user. **Hi-Res Designer** (disk) from *Antic* is for Graphics Mode 8 drawing using memory banks in the 130XE. **Rambrandt** (disk) allows you to select the graphic mode. The last two programs are good for the higher-level user with an interest in graphic arts.

Mathematics:

Computer-aided instruction in mathematics is popular. My favorite is one of the versions of the **Function Machine** (disk), available from Bellcom on disk #90. (Bellcom also had many more educational disks.) The user tries to predict the output of a "machine" after inserting a number. The "black box" or machine may add, subtract, multiply, divide or even exponentiate the input, or combine these operations. Levels of difficulty may be selected to be suitable for late elementary grades through algebra students. Animation and sound effects help make Function Machine entertaining, and it exercises logical reasoning more than rote memorization.

Visicalc (disk) from Visicorp is a spread-sheet which, among other things, makes a superb rankbook. Cells may hold students' names, areas of evaluation, numerical grades and the formulae to calculate averages. Output, printed to disk, may be transferred to a word processor.

Look through the software libraries on the various BBS's and information services for more public domain, freeware and shareware. My offering is **AREATUTR.BAS** (disk, via modem), file #5851 on the GEnie 8-bit board. It's a tutorial on multiplication and area, showing graphically how to find the area of rectangles and triangles. It also can "quiz" a user on areas of circles and/or ellipses. As Area Tutor is written in TurboBASIC, download this programming language if you don't yet have it.

Commercial products include **SAT Math** (disk) from Hayden Software which involves mostly drill, and **Graphing** (disk) from Atari which explores Cartesian and polar-coordinate graphs. Graphing has a variety of learning games, of somewhat uneven value, but overall very much worthwhile. Volume 1 of the **Sesame Street Learning Library** (disk), from Hi Tech Expressions, has three math games for pre-school age or early elementary grade students: **Astro-Grover** helps teach counting, **Ernie's Magic Shapes** begins recognition of polygons and

Big Bird's Special Delivery aids in building skill in classifying and understanding sets.

Social Studies:

One of the most popular programs among my students is **Agent U.S.A.** (disk) from Scholastic Inc. This game has the children exploring the U.S. to find a "fuzz machine" that is taking over the country. Without being obviously didactic, it soon has the user applying map skills and time-telling skills as well as learning the names of major cities, capitals and states. It is interesting and challenging enough to occupy a team for an hour at a time (at which point I must pry them from the keyboard).

The Seven Cities of Gold (disk) from Electronic Arts is a simulation in the tradition of Hamurabi. Outfit an expedition, set sail from Spain and explore the New World. Maps are based on areas of the Americas, though decisions are somewhat simplified: conquer or evade the natives or barter with them.

Science:

In science, the Atari eight-bits offer incredible value for the price! The **AtariLab Starter Set** (cart. and hardware) and the **AtariLab Light Module** (cart. and hardware, to be used with the patchbox from the Starter Set), both from Atari Learning Systems, offer the opportunity to make measurements in the "real world" and to control processes using the I/O ports built into the Atari. The two (or four in the 400 and 800) joystick/paddle ports contain four (or eight!) eight-bit analog-to-digital converters which may be used to measure temperature or light (or anything else which may be represented as an electrical resistance). The ports may also be set by software for output to switch loads of a few milliamperes.

Both AtariLabs are available for less than $20 from B&C Computervisions. Though the resolution of data is at best .5%, it is ample for student use or even some serious research. It would be trivial to graph the temperature and insolation at four heights simultaneously during the course of a week, using an Atari 400 or 800, four thermistors and four CdS photocells (one thermistor or one photocell are included in each kit). A comparable chart recorder would cost hundreds of dollars; furthermore, your computer can analyze, graphically display and print the data, as well as record it. The excellent user manuals describe the function of the hardware and its interaction with the computer, set experiments to perform and suggest further avenues of experimentation. In my first use of the Starter Set, I was fascinated to watch a beatiful exponential curve plotted as the thermistor was removed from a block of ice and left to warm in the air.

To follow our seventh and eighth grade science curricula I've written my own software. **Optical Illusions and Audiovisualizer** (disk) contains two programs; the first presenting ten illusions utilizing the computer's ability to alter colors and luminances, while the second produces pure or mixed tones and graphs amplitude against time. **Ecologian** (disk) simulates the growth of organisms and their effect on a barren planet. **Elements of Chemistry** (disk or GEnie file #5805) contains a learning game for the Periodic Chart, displays the ground-state electron configuration of the elements and calculates the molecular mass of a compound. **Kinetic Theory** (GEnie file #5729) demonstrates molecular motion due to heat. Disks are available from Bresnik Software.

Atari Planetarium (disk) from Atari provides an incredible representation of the sky, showing hundreds of stars and far-sky objects, the positions of the moon, sun and planets — it can even simulate an eclipse. Planetarium is captivating for the students, it provides a useful tool for finding astronomical objects, whether on-screen or from a printout to bring outdoors, and it's informative. Recalculation of the planets' and moon's positions makes the program slightly "jerky", but it is arguably one of the best programs for an eight-bit Atari.

And some other software...

Miscellaneous educational favorites include **Chess** (cart.) from Parker Brothers, **Computer Chess** (cart.) from Atari and **Sargon III** (disk) from Hayden Software. All allow playing at various response times or ability levels and stepping forward or backward through a game. Sargon also provides a fine library of openings and complete

games and allows saving games to disk. I've found all three play better games than some dedicated chess computers [no, they won't beat Berliner or his creations, though].

The Pond (disk) and **The Factory** (disk) from Human Engineered Software provide excellent, entertaining exercises in reasoning or logical ability for "ages 7 and up". In Pond, you help a frog navigate from lily-pad to pad. Using Factory you copy a part by a sequence of steps, requiring pre-visualization of the final state after painting, punching and rotating the piece.

Programming languages, such as **Delta Drawing** (cart.), from Spinnaker, and **Atari Logo** (cart.), and **Pilot** (cart.) from Atari are justified not only through an end-product but through their use in developing logical thought-processes. To draw a shape or write a quiz calls for modelling, predicting, planning ahead and other higher-level abilities. More advanced students might learn Pascal, C, or even 6502 Assembly Code using the **Atari Assembler-Editor** (cart.) from Atari.

A modem allows contact with students and teachers outside the classroom. By calling a local number for the **School Forum**, we can reach **Fido-Net** and correspond directly with students in places as diverse as Massachusetts, Tennessee, British Columbia, France, New Zealand or Japan. A $30 SX212 modem works well directly with my Atari 800XL, and we use **Bob Term** (disk), version 1.21, from Robert Puff, "a shareware terminal program". Bob Term offers a capture buffer, automatic dialing, x- and y-modem file transfer protocol, and virtually every other amenity available in a communications program. Another fine terminal program is **SX212 Express** (disk) by Keith Ledbetter.

Summing It Up

All right, I give up. There are dozens of other fine educational programs, but this survey should give you some idea of the variety of software available. Why not submit an article to *Atari Classics*? Review your own favorites, or discuss in greater depth some of the software mentioned so briefly here. Desribe how you've used the software and how it worked.

Please mail your manuscript, preferably in 5.25" ATASCI disc format (DOS 2.0 or 2.5 or MyDOS) or 3.5" IBM/Atari ST format (as ASCII text), to me at:

Bart Bresnik
555 Ware Street
Mansfield, MA 02048

Or e-mail your article as a letter with an attached file to:
b.bresnik@genie.geis.com
[We need a new word for *manuscript*: few articles are now hand-written; many are electronic.]

Oh, have I mentioned **Mapware**? ...and then there's **Turtle Tracks** and the **Fraction Factory** and **M.U.L.E** and...

Sources of Software:

In many cases, sources listed no longer support Atari eight-bit computers. Those marked with an asterisk (*) are most likely to have software mentioned or other educational titles.

Activision, Inc.
P.O. Box 7287
Mountain View, CA 94039
*American Techna-Vision
(800) 551-9995
15338 Inverness Street
San Leandro, CA 94579
Atari Corp., Sunnyvale, CA 94086
*B&C Computervisions
(408) 986-9960
2730 Scott Boulevard
Santa Clara, CA 95050
*Bellcom
P.O. Box 1043
Peterborough, Ontario
Canada K9J7A5
(recently left eight-bit market but may have remainders)
*Bensley Consulting
P.O. Box 301
Westfield, IL 62474-0301
*Best Electronics
(408) 243-6950, Suite 290
2021 The Alameda
San Jose, CA 95125
*Bresnik Software
555 Ware Street
Mansfield, MA 02048-2925

Broderbund Software
17 Paul Drive
San Rafael, CA 9403-2101
CBS Software
Greenwich, CT 06836
Compute! Publications
(919) 275-9809, Inc.
P.O. Box 5406
Greensboro, NC 27403
Electronic Arts
2755 Campus Drive
San Mateo, CA 94403
Epyx, Inc.
1043 Kiel Court
Sunnyvale, CA 94089
Futurehouse
310 West Franklin Street
P.O. Box 3470
Chapel Hill, NC 27514
*GEnie, GE Information Services
(800) 638-9636 (voice)
P.O. Box 6403
Rockville, MD 20850-1785
Hayden Software Co.
600 Suffolk Street
Lowell, MA 01854
Hi Tech Expressions, Inc.
584 Broadway
New York, N.Y. 10012
Human Engineered Software
150 North Hill Drive
Brisbane, CA 94005

*Ledbetter, Keith
5834 Dafred Drive
Rockford, IL 61107
Mindscape, Inc.
3444 Dundee Road
Northbrook, IL 60062
Parker Brothers
P.O. Box 1012
Beverly, MA 01915
*Puff, Robert
Suite 222, 2117 Buffalo Road
Rochester, NY 14624
San Jose Computer
(408)995-5080
1278 Alma Court
San Jose, CA 95112
Scholastic Inc.
1290 Wall Street West
P.O. Box 641
Lyndhurst, NJ 07071
Spinnaker Software Corp.
215 First Street
Cambridge, MA 02142
Springboard Software
7808 Creekridge Circle
Minneapolis, MN 55435
*Toad Computers
(410)544-6943
570 Ritchie Hwy.
Severna Park, MD 21146
Visicorp
2895 Zanker Road
San Jose, CA 95134

800, XL, XE COMPUTERS AND ACCESSORIES

COMPUTERS

HDA014	65XE 64K	105.00
HDA008	**130XE** 128K	175.00
HDA001	XEGM 64K	95.00
HDA040	XEGM 64K W/LG, J, & SW......	139.00
HDA010	600XL 16K...................	49.95

RECONDITIONED:

HDA017	800XL 64K (like new).......	95.00
HDA030	800XL 256K................	175.00
HDA013	600XL 16K	39.95
HDA012	600XL 64K	59.95
HDA015	**800 48K**	59.95
HDA009	400 16K	24.95

MODEMS

HDA043	300 BAUD XM301 w/disk soft..	19.95
HDG029	1200 BAUD **SX212** req,ACA058..	29.95
PKG006	SX212 With SX EXPRESS........	39.95

REQUIRE INTERFACE (850/PRCON)

HDG036	FAST TALK 1200 BAUD	19.95
HDG029	1200 SX212	29.95
HDG004	2400 Smartlink	49.95
HDG006	2400 Modem/9600 FAX	99.95
HDG002	9600 FAX/Modem	149.95
HDG013	14400 FAX/Modem	175.00
HDG055	ZYXEL FAX/VOICE Modem 16800.	379.00

MONITORS

HDG047	Composite Green Screen	89.00*
HDG047D	Composite Mono Demo........	75.00*
HDG046	Composite Color Demo when available	
	* No audio output from monitor	

DISK DRIVES/RECORDERS

HDA018	810 Disk Drive(like new)...	80.00
HDA035	810 less face plate........	70.00
HDA023	810 W/HAPPY	99.95
HDA033	1050 Disk Drive............	175.00
HDA007	1050 Reconditioned	135.00
HDA042	XF551 Disk Drive	199.00
HDA053	XF551 Reconditioned........	175.00
HDA037	410 PROGRAM RECORDER	14.95
HDA029	1010 PROGRAM RECORDER	29.95

8-BIT DRIVE ENHANCEMENTS

ACA042	1050 US DOUBLER W/SPARTA DOS	44.95
ACA011	1050 US DOUBLER NO DOS ...	24.95
HDA055	XF551 5" TO 3.5" CONVERSION	59.95
HDA058	XF551 ADD ON 3.5"	79.95
ACA008	810 HAPPY ENHANCEMENT.......	49.95
ACA007	1050 HAPPY ENHANCEMENT	125.00
ACA047	1050 HAPPY CONTROLLER	29.95

SCAN-IT! ARCHIVER EDITOR:

ACA013	810 ARCHIVER CHIP W/Side PCB	39.95
ACA015	810 HAPPY ARCHIVER	29.95*
ACA014	1050 HAPPY ARCHIVER	29.95*
ACA016	SUPER ARCHIVER UPGRADE	29.95**
ACA012	1050 SUPER ARCHIVER CHIP ...	69.95
	* Req. HAPPY Installed,ACA014, OR ACA015	

MEMORY UPGRADES

ACA020	48K KIT FOR 400 (SOLDER)....	14.95
ACA022	64K RAM FOR 600XL (PLUG IN).	19.95
ACA021	64K RAM FOR 600XL (SOLDER) .	18.95
PRA056	16K RAM PCB FOR 800/CHIPS ..	10.00
ACA004	128K RAM FOR XE GAME MACHINE	49.95
ACA068	288K FOR 800 With PCB'S.....	100.00
ACA066	288K FOR 800/(2) 16K PCB'S .	120.00
ACA049	NEWELL XL 256K	29.95*
ACA073	NEWELL XL 1-4 MEG 49.95**	
ACA080	NEWELL 65XE 1-4 MEG 49.95**	
ACA074	NEWEL 130XE 1-4 MEG 49.95**	
ACA026	RAMBO XL 256K	27.95*

* Requires (8) 256K DIPPS
** Requires (8) 1 MEG DIPPS FOR 1 MEG
  or (8) 4 MEG DIPPS for 4 MEG

RAM

ICG005	64K 4164 (SET OF 8).........	15.00
ICG004	256K 41256 (SET OF 8)	15.00
ICG008	1 MEG 41000 EACH	6.00
ICA082	16K 4116 EACH	2.00
ICG464	4X64K 41464	7.00

PERSONAL ACCESSORIES

ACG086	ATARI CLOTH SEW-ON LOGO	1.00
ACG088	ATARI LOGO BELT BUCKLE LARGE.	9.95
ACG012	ATARI LOGO BELT BUCKLE SMALL.	9.95
ACG097	ATARI ROUND LOGO STICK PIN ..	4.95
ACG089	ATARI LOGO STICK PIN	4.95
ACG077	BLACK MUG/GOLD ARARI LOGO ...	7.95
ACG072	WHITE MUG/BLACK ATARI LOGO ..	6.95

800, XL, XE COMPUTERS AND ACCESSORIES

PRINTERS

ATARI:DIRECT CONNECT NO INTERFACE

HDA050	XDM121 Letter Quality DaisyW	99.95
PKG005	XDM121 With Sheet Feeder ...	125.00
HDA046	XMM801 Dot Matrix w/graphics	99.95
HDA048	1029 80 COLUMN TRACTOR FEED	75.00
HDA047	820 (40 COLUMNS)	14.95
HDA003	1020 COLOR PLOTTER (40 col).	19.95

REQUIRE INTERFACE (850/PRCON/MPP)

HDG032	STAR NX-1001 MULTI FONT	159.00
HDG020	STAR NX-1000 Demo	99.95
HDG019	Citizen 120D Demo	79.95

Note:Make sure software & printer are compatible.

INTERFACES

PRINTER:

ACA028	MPP-1150	49.95
ACA029	MPP-1151 (FOR 1200XL)	74.95
HDA038	OKI 10 PLUG & PRINT (NO BOX)	29.95

PRINTER & MODEM:

ACA002	ATARI 850 INTERFACE..(RECON)	74.95
ACA036	P:R: CONNECTION Special $$$	49.95
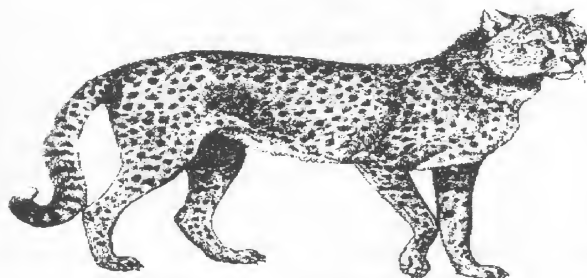
PRINTER SUPPLIES

RIBBONS:

SUG500	Atari 820 Purple	9.95
SUG501	Atari 825 Black	6.00
SUG002	Atari XMM801/SMM804 Black...	9.95
SUG514	Atari XDM121 Black Mylar....	9.95
SUG518	Atari XDM121 Black Fabric ..	14.95
SUG504	Atari 1025 Spool Black......	3.00
SUG502	Atari 1029 Black	7.95
SUG519	1025 OUTDATED RIBBON 12 Pack	5.00
SUG510	NX-10/NP-10/NB-10 STAR Black	7.95
SUG511	NX-1000/1001 STAR Black.....	7.95
SUG512	NX-1000 RAINBOW STAR	10.95
SUG069	NX-1020 STAR Black	9.95

PENS:

SUG506	1020 PEN SET Black Atari ...	1.00
SUG516	1020 PENS 10 SETS Black	5.00
SUG507	1020 PEN SET COLOR Atari ...	3.00
SUG517	1020 PENS 10 SETS Color	10.00

ROLLERS:

SUA002	1027 INK ROLLERS Atari	5.95
SUA005	1027 INK ROLLER 10 Pack	20.00

Note:These are getting old but still work. Sorry no fresh ones.

PARTS:

PRA082	1020 PEN Holder Wheel	1.95
PRG054	801/804 LOCK Lever	5.00
PRA083	XDM121 WHEEL 10 Courier	15.00
PRA085	XDM121 WHEEL 12 Courier	17.50
ACA081	XDM121 Sheet Feeder	49.95

PAPER:

SUA004	820 PAPER (2 ROLLS)	3.90
SUA003	822 THERMAL PAPER (2 ROLLS).	3.95
SUA001	1020 PAPER (2 ROLLS)	3.95

SUG003	ADDRESS LABELS PIN FEED 1000	7.00
SUG037	ADDRESS LABLES PIN FEED 5000	19.95
SUG008	DISK MAILER ENVELOPE	.50

JOYSTICKS/CONTROLLERS

ACG500	ATARI CX-40 JOYSTICK	6.50
ACG519	ATARI PRO JOYSTICK 7800 recon	9.95
ACG503	EPYX 500XJ JOYSTICK	14.95
ACG523	PROSTICK II JOYSTICK	6.95
ACG514	BP PROSTICK(STD W/GRIP HANDLE)	6.95
ACG513	REMOTE CONTROL JOYSTICK (2).	19.95
ACG506	SLIK STICK JOYSTICK	9.95
ACG530	TAC-30 JOYSTICK	16.95
ACA520	ATARI CX-80 TRAKBALL	9.95
ACA518	ATARI TRAKBALL (RECON)......	4.95
ACA006	PADDLE CONTROLLERS	9.95
ACA505	BEST LIGHT GUN XL/XE	24.95
ACA053	ATARI LIGHT GUN/BUGHUNT	44.95
ACA057	LIGHT GUN like new(UNBOXED)	19.95

JOYSTICK PARTS

PRG045	PADDLE CONTROLLER POTS (2) ..	1.00
CAG009	6 INCH MOUSE EXTENDER	6.00
CAG006	10 FOOT JOYSTICK EXTENDER ...	5.00
CAA015	JOYSTICK REPLACEMENT CABLE ..	3.00
PRG042	ATARI JOYSTICK PCB	1.50
PRG040	JOYSTICK INSERT (1)	1.50
PRG041	JOYSTICK HANDLES (2)	3.95
PRG055	PADDLE CABLE	1.50

DISKS AND SUPPLIES

DISKSETTES:

SUG052	5-1/4" ATARI FORMATTED	10.00
SUG067	5-1/4" OPTIMA IN PLASTIC BOX	5.00*
SUG046	5-1/4" 810/1050 (not XF551)	3.00*
SUG062	5-1/4" 810/1050/XF551	4.00

NOTE: *NOT FOR XF551

BULK DISKS:

SUG016	5-1/4" BULK DISKS 10	2.95
SUG017	5-1/4" BULK DISKS 100	20.00
SUG018	5-1/4" BULK DISKS 1000	100.00

Bulk disks may contain old software and may be write protected Use ACG059 or ACG060 to notch

CLEANERS & MISC:

SUG048	3-1/2 & 5-1/4 HEAD CLEAN KIT	9.95
SUG022	5-1/4" WRITE PROT. TABS (100)	1.00
SUG058	5-1/4" COLR VINYL SLEEVES 12	1.50
ACG059	SQUARE DISK NOTCHER	4.95
ACG060	DELUXE SQUARE DISK NOTCHER..	9.95

HOLDERS:

ACG042	5-1/4" DISKMINDER 75	4.95
ACG250	5-1/4" MEDIAMATE 50	8.95
ACG061	Cartridge FLIP & FILE	4.95
	(holds 8 cartridges and 10 5-1/4" disks)	
ACG073	MULTI MEDIA	7.95
	(CD's, 40 5-1/4" & 3-1/2" disks)	
ACG074	FLIP & FILE All Media	9.95
	(CD's, 140 5-1/4" & 3-1/2" disks)	

POWER ADAPTERS

PRA001	400/800/810/1050/XF551	9.95
PRA053	XL/XE COMPUTER - 1 AMP......	15.00
PRA006	XL/XE COMPUTER - 1.5 AMP....	20.00
PRA029	XEP80/SX212/2600	9.95
PRA017	830/835 MODEM...............	9.95
PRA026	1010 PROGRAM RECORDER.......	5.00
PRA027	1030 MODEM..................	9.95
PRA028	1027 PRINTER................	20.00
PRA052	5200 GAME MACHINE...........	20.00
PRA050	7800 GAME MACHINE	15.00

SERVICE MANUALS

SAMS COMPUTERFACTS:

FSA001	400 COMPUTER	9.95
FSA005	810 DISK DRIVE	24.95
FSA007	1025 PRINTER	9.95
FSA006	1050 DISK DRIVE	24.95
FSA003	800XL	24.95

ATARI FIELD SERVICE MANUALS:

FSA013	130XE COMPUTER TECH NOTES ..	10.00
FSA014	400/800 COMPUTER	25.00
FSA021	410 RECORDER	15.00
FSA015	800XL COMPUTER	20.00
FSA016	810 DISK DRIVE	10.00
FSA017	820 PRINTER	5.00
FSA018	825 PRINTER	20.00*
FSA019	835 MODEM	5.00
FSA020	850 INTERFACE	10.00
FSA008	1010 RECORDER	5.00
FSA009	1020 PRINTER	5.00
FSA010	1025 PRINTER	20.00
FSA011	1050 DISK DRIVE	20.00
FSA012	1200XL COMPUTER	20.00*
FSA022	CX22 TRACKBALL	10.00

DIAGNOSTICS

PRA008	1050 DIAGNOSTIC DISK........	15.00
	(NOT FOR MODIFIED DRIVES)	
PRA009	810 DIAGNOSTIC CART.........	15.00
PRA010	SALT 2.07 400/800 CART	15.00
PRA011	SALT SE 800XL/XE CART	15.00
PRA012	CPS SUPER SALT CART	15.00
PRA014	SUPER SALT TEST FIXTURE	50.00

DRIVE PARTS

PRA061	810 SIDE WITH DATA SEPARATOR	15.00
PRA058	810 ANALOG BOARD	10.00
PRA060	810 POWER BOARD	15.00
PRA032	810 MPI DRIVE MECH	25.00
PRA033	810 TANDON DRIVE MECH	50.00
PRA034	810 PCB SET/DS/SIDE/PWR/ANLG	40.00
HDA027	810 DRIVE/BASE (NO CASE)....	50.00
PRA039	810 MPI DRIVE BELT	3.00
PRA042	810 TANDON DOOR	8.00
PRA046	810 MPI PRESSURE PAD	3.00
ACA052	810 DRIVE REAR LABLE SET ...	5.00
ACA054	810 DRIVE DOTS (SET OF 4) ..	1.00
PRA038	810/1050 TANDON DRIVE BELT .	7.95
PRA077	1050 WORLD STG DRIVE BELT...	7.95
PRA048	1050 TANDON TRK ZERO SENSOR.	12.00
PRA047	1050 WRLD STG TRK ZERO SENSOR	12.00
ACG087	STICK-ON DRIVE NUMBER LABELS.	1.00
PRA041	1050 DRIVE MECH TANDON	75.00
PRA088	1050 PCB	50.00
PRA072	XF5551 MECH ATARI	100.00
PRA086	XF551 MECH GENERIC	50.00
PRA087	XF551 PCB	95.00

COMPUTER/PARTS

PRA005	400 MAIN	10.00
PRA035	800 MAIN W/ALL CHIPS.......	10.00
PRA030	800 CPU,GTIA,6502 & ANTIC ..	10.00
PRA057	800 10K ROM	10.00
PRA055	800 POWER	5.00
PRA019	800 PCB SET WITH MAIN,CPU, 10K OS, POWER AND RAM...	40.00
PRA020	800 PCB SET LESS RAM	30.00
PRA021	800XL PCB	75.00
PRA022	1200XL PCB (64K)..........	40.00
PRA025	800 SPEAKER	2.00
PRA082	1020 PRINTER PEN HOLDER WHEEL	1.95

PRA016	CARTRIDGE CASE	.75
PRA062	EPROM cartridge pcb 16k 2X2764	5.00
PRA065	EPROM cartridge pcb 8k 2x2532	4.00
PRA004	RF MODULATOR 600/800XL	7.25
PRA023	RF MOD 65/130XE	14.95
PRA024	RF MODULATOR XEGM	12.00

Keyboards:

PRA002	400 MEMBRANE	10.00
PRA031	800 (NEW)..................	30.00
PRA007	800XL (RECON)	25.00
PRA079	65XE/130XE/................	30.00
PRA084	XE GAME MACHINE	30.00
PRA018	1200XL	25.00
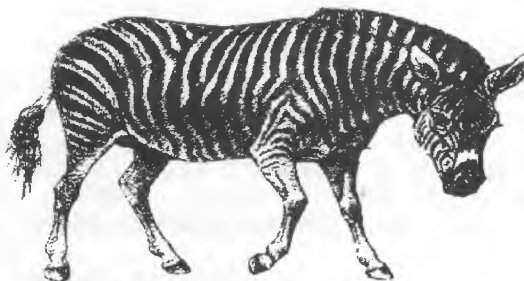
INTEGRATED CIRCUITS

ICA296	800 ANTIC CO12296	5.00
ICA377	800 CPU 6502 ......CO14377	5.00
ICA299	810 ROM C CO11299	5.00
ICA329	810 FDC WD1771.....CO14329	5.00
ICA099	850 ROM B CO12099	5.00
ICA541	1050 EPROM L	5.00
ICA001	1050 FDC WD2793	19.95
ICA303	ASSEM REV B CO60303	7.50
ICA502	BASIC REV A CHIP SET	5.00
ICA947	BASIC REV C CO24947	12.00
ICA991	FREDDIE CO61991	12.00
ICA805	GTIA CO14805	5.00
ICA745	MPU 6507 ....CO10745	5.00
ICA499	OS ROMS (499B-599B)	5.00
ICA795	PIA 6520 ....CO14795	5.00
ICA750	PIA 6532 ....CO10750	5.00
ICA294	POKEY CO12294	5.00
ICA328	RAM 6810 ....CO14328	5.00
ICA444	VCS TIA 444 ....CO10444	5.00
ICA697	XL/XE ANTIC CO21697	12.00
ICA618	XL/XE MMU CO61618	5.00
ICA598	XL/XE OS CO61598	12.00
ICA806	XL CPU CO14806	8.00
ICA472	XL DELAY CO60472	5.00
ICA953	XE GATE ARRAY......CO25953	12.00
ICA696	XF551 ROM C101696	15.00
ICA235	XF551 CPU C070235	10.00

EQUIPMENT COVERS

CUSTOM FIT:

ACA071	825 PRINTER	4.95
ACA072	2600 COVER (OLD STYLE)	4.95
ACA034	800 COMPUTER	10.95

GENERIC GREY NYLON:

ACG150	UNIVERSAL COVER U2 .... FITS 800XL/810/1050/130XE/1027	7.95
ACG151	UNIVERSAL COVER U4 .... FITS 12" MONITOR	12.95
ACG152	UNIVERSAL COVER U7 .... FITS 800/1200XL/STAR PRINTER/ 825/XDM121/XMM801	8.95

CLEAR PLASTIC CUSTOM FIT:

ACA059	130XE KEYBOARD SKIN	19.95

🕹 800, XL, XE COMPUTERS AND ACCESSORIES 🕹

COMPUTER ACCESSORIES

ACA061	XEP 80 COLUMN INTERFACE....	49.95*
PKG004	XEP80 W/Atariwriter 80	59.95*
	*Requires monitor for 80 column.	
ACA086	MIDI MATE interface no soft	49.95
ACA037	MIDI TRACK II with software	69.95
ACA038	MIDI TRACK III for 130XE	69.95
ATD948	MIDITRACK II TO III upgrade	20.00
ACA043	R-TIME 8 clock cartridge ..	49.95
HDA054	BLACK BOX upgrade	199.95
ACA087	MARS XL Upgrade	Call
HDA056	EPROM Programmer	169.95
ACA027	ANIMATION STATION	79.95
ACA078	LIGHTPEN Atari	14.95
ACA550	NUMERIC KEYPAD	9.95
ACA005	FASTCHIP For 800 (NEWELL)...	19.95
ACA023	OMNIVIEW 80 For 64/256XL ...	29.95
ACA076	OMNIMON 400/800 W. Onmiview.	29.95
ACA075	OSNXL OP SYSTEM (XL/XE)	29.95
ACA025	RAMROD XL Without Omnimon ..	19.95
ACA044	RAMROD XL/XE With Omnimon ..	49.95
ACA077	RAMROD 800 With Omnimon	39.95
PKG001	AtariLab with temp & light ..	19.95
ATC045	AtariLab Starter with temp ..	14.95
ATC046	Atarilab Light add on	14.95
ACG084	ATARI LOGO ALUMINUM 3/4"x 3/4"	.25
ACG085	ATARI LOGO ALUMINUM 1/4" X 2"	.10
ACG098	ATARI LOGO ALUMINUM Small Hex	.10
ACG050	POWER STRIP With 6 Outlets .	14.95
ACG041	POWER PAD With 5 Outlets ...	21.95
ACG034	PRINTER Stand	7.95
ACG032	MONITOR Stand	19.95

PC Xformer 3.0 8-Bit 800/XL/XE Emulator to run your 8-bit software on a PC Clone $29.95
Run your 8-Bit software on an IBM Style Computer.
Does not run Atari disks directly, software must be transfered via modem or PC to SIO.
PC to SIO use PC Clone as a drive and printer for 8-Bit $5.00. Shareware registration & adapter cable/interface required.
ST Xformer run your 8-Bit software on an ST Computer $7.98. Requires cable.
ST Xformer with SIO to ST cable $29.95

CABLES

CAG030	RF SWITCH BOX ELIM CABLE ...	2.00
CAA010	RF CABLE FOR 800 COMPUTER...	3.00
CAG032	RF CABLE FOR XL OR ST	3.50
CAG002	STRAIGHT THRU 25PIN M/M 6FT.	10.00
CAG035	STRAIGHT THRU 25PIN M/F 6FT.	10.00
CAG036	STRAIGHT TRUR 25PIN M/F 15FT	15.00
CAG017	MIDI CABLE 6 FT.	5.95
CAG028	MIDI EXTENDER CABLE 10'	10.00
CAG022	TELEPHONE CABLE - 6 FOOT ...	1.00
CAA011	825 ADAPTER TO PARALLEL CABL	15.00
	SPECIAL 8-BIT:	
CAA007	3 FOOT 13 PIN I/O CABLE	9.95
CAA008	5 FOOT 13 PIN I/O CABLE	10.95
CAA009	6 FOOT 13 PIN I/O CABLE	12.95
CAA001	850 TO 825 PRINTER	10.00
CAA002	850 TO PRINTER-PARLLEL......	15.00
CAA003	850 TO MODEM	15.00
CAA004	850 TO TERMINAL	15.00
CAA005	COMP COLOR MONITOR GENERIC .	10.00
CAA006	COMP COLOR MONITOR (CX-89)..	10.00
CAA012	COMP MONO MONITOR(CX82)	5.00

CONNECTORS / ADAPTER

ACA045	I/O EXPANSION BOX - 3 WAY ..	19.95
PRA051	13 PIN I/O CONNECTOR FEM....	4.00
PRA015	13 PIN I/O CONNECTOR PCB MALE	3.00
PRG043	9-PIN JOYSTICK SOCKET (2) PCB	1.00
PRA074	RF TV SWITCH BOX 300 OHMS..	2.50
PRA075	RF TV SWITCH BOX 75/300 OHM	3.50
PRA076	RF DELUXE SW BOX 75/300 OHM	3.95
PRG002	GENDER CHANGER MM DB25	9.95
PRG003	GENDER CHANGER FF DB25	9.95
PRG004	NULL MODEM CONNECTOR M/F ...	9.95
PRG005	NULL MODEM CONNECTOR F/F ...	9.95
PRG008	JUMPER BOX M/F DB25	9.95
PRG009	MINI TESTER M/F DB25	19.95
PRG006	GENDER CHANGER 9-PIN F/F ...	8.00
PRG007	GENDER CHANGER 9-PIN M/M ...	8.00
PRG010	GENDER CHANGER 36-PIN FF DB36	16.00
ST CABLE TO USE 8-BIT DRIVES & SOFTWARE:		
CAS020	XFORMER CABLE WITH SOFTWARE.	24.95

OWNERS MANUALS

BKA056	XEGM COMPUTER	10.00
BKA081	65XE/130XE COMPUTER	10.00
ATD840	1050 DISK DRIVE W/DOS 2.5...	10.00
ATD844	XF551 DISK DRIVE W/DOS XE ..	10.00
BKA070	600XL COMPUTER	5.00
BKA074	800 COMPUTER	5.00
BKA071	800XL COMPUTER	5.00
BKA076	810 DISK DRIVE	5.00
BKA080	820 PRINTER	5.00
BKA075	825 PRINTER	5.00
BKA079	850 INTERFACE	5.00
BKA078	1010 PROGRAM RECORDER	5.00

BOOKS

BKA001	*YOUR ATARI COMPUTER*	12.95
BKA046	400/800 TECH. REF. NOTES SET.	10.00
BKA050	1200XL SUPPL.TO TECH REF ..	5.00
BKA051	810 DOS UTIL. SOURCE LISTINGS	5.00
BKA045	850 TECHNICAL MANUAL	10.00
BKA039	ASSEMBLER EDITOR MANUAL	10.00
BKA043	101 PROGRAMMING TIPS/TRICKS	5.00
BKA034	ATARI BASIC REFERENCE MANUAL	5.00
BKA016	ASTROLOGY (WITH DISK)	9.95
BKA021	ATARI BASIC (SELF TEACHING).	5.00
BKA012	COMPUTER PLAYGROUND	9.95
BKA036	DE RE ATARI	14.95
BKA040	DOS II REFERENCE MANUAL	10.00
BKA018	FORTH ON THE ATARI	5.00
BKA057	GAMES FOR THE ATARI	5.00
BKA044	HOW TO PROG IN 6502 MACH LNG	5.00
BKA032	INSIDE ATARI BASIC	5.00
BKA031	KIDS AND THE ATARI	11.95
BKA063	LOGO REFERENCE MANUAL SET ..	10.00
BKA014	MASTER MEMORY MAP	10.00
BKA035	MICROSOFT BASIC II REF......	10.00
BKA053	PILOT STUDENT REF. GUIDE ...	5.00
BKA054	PILOT PRIMER (TEACHERS)	5.00
BKA030	THE BOOKKEEPER USER GUIDE ..	5.00
BKG004	40 FLIGHT SIM. ADVENTURES ..	9.95
BKG003	40 MORE FLIGHT SIM. ADV.....	9.95
BKG095	40 SUBMARINE WAR ADVENTURES.	9.95
BKG011	FLYING ON INSTRUMENTS.	9.95
BKG068	HARD DRIVE BIBLE	24.95
BKG092	REALISTIC COMM. FLYING W. FS	9.95
BKG064	OFFICIAL BOOK OF ULTIMA	9.95
BKG025	QUEST FOR CLUES	24.95
BKG005	ELECTRONIC BATTLEFIELD	9.95
BKG063	OFFICIAL F-15 HAND BOOK	9.95
BKG095	SUB SIMULATOR WAR AD	9.95
BKG010	SUB COMMANDER	9.95

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ATD902	FIRST XLENT WORD PROC	22.50
ATD532	HOMEWORD	9.95
ATD821	PROOF READER (ATARIWITER)	9.95
ATD931	TYPIT WORD PROCESSOR 48K	9.95
ATD077	I LOVE MY ATARIWRITER	12.00
ATD533	PRINTER DRIVER/ATARIWRTR	8.95
ATD822	ATARIWRITER + W/Proof R.	39.95
ATD823	ATARIWRITER 80	39.95
	Requires ACA061 XEP-80 & monitor.	
PKG004	XEP-80 W/ATARIWRITER 80	59.95
	Reg. ATARIWRITER is with cartridges.	

PRINT/PUBLISH/PAINT/HOME

ATD320	CELEBRITY COOKBOOK	26.95
ATD321	COMPUTE YOUR ROOTS	19.95
ATD575	ENHANCED POKEY PLAYER	14.50
ATD892	GRAPHIC MASTER	14.95
ATD499	GRAPHICS TRANSFORMER	22.50
ATD496	HUMPTY DUMP	14.95
ATD553	MAGNIPRINT II+	22.50
ATD123	MEGAFONT II+	13.50
ATD288	NEWS STATION	26.95
ATD138	NEWS STATION COMPANION	26.95
ATD324	NEWSROOM (XL WITH/1050)	19.95
ATD136	PAGE DESIGNER	13.50
ATD839	PAINT	14.95
ATD752	PLAYER MAKER (ATARI)	4.95
ATD142	PM ANIMATOR	31.50
ATD500	POP -N- ROCKER	22.50
ATD325	PRINT POWER(REQ 1050 DD)	19.95
ATD535	PRINTERS DEVIL	13.50
ATD326	PRINTKIT(REQ 1050 DISKD)	19.95
ATD280	PRINTSHOP	34.95
ATD677	PRINTSHOP DRV 1020	13.50
ATD651	PRINTSHOP DRV NX-2400	13.50
ATD726	PRINTSHOP DRV OKIMATE 10	13.50
ATD741	PRINTSHOP DRV XMM801	13.50
ATD486	PRINTWIZ	26.95
ATD127	PS INTERFACE	13.50
ATD372	PS UTILITY DISK	26.95
ATD137	PUBLISHING PRO	35.95
ATD681	RECIPE MANAGER	13.50
ATD684	RESPONSE ANALYSIS PROGRM	13.50
ATD125	RUBBER STAMP	13.50
ATD754	SCREEN MAKER (ATARI)	4.95
ATD400	TYPESETTER	17.95
ATD141	VIDEO TITLE SHOP	14.95

MUSIC & MIDI

ATD379	ATARIMUSIC I NOTES/STEPS	14.95
ATD381	ATARIMUSIC II SCALES/KEY	14.95
ATD231	ELECTRONIC DRUMMER	13.50
ATD162	GUITAR WIZARD	26.95
ACA037	MIDITRACK II 800/800XL	69.95
ACA038	MIDITRACK III 130 XE	69.95
ATD948	MIDITRACK II TO III UPGR	20.00
ATD619	MUSIC BOX	14.95
ATD382	MUSIC PAINTER	14.95
ATD163	MUSIC PLAYER	13.50
ATD671	OASIS W/MIDIMATE 130XE	49.95
ATD164	SONGWRITER	9.95
ATD531	MIDIPATCH YAMAHA DX-7	9.95
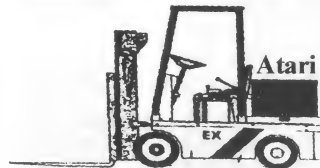
BUSINESS

ATD687	ATARI TIME PIECES	6.99
ATD831	BOND ANALYSIS	9.95
ATD826	BOOKKEEPER	19.95
ATD827	BOOKKEEPER KIT/KEYPAD	24.95
ATD322	DATAMANAGER	8.95
ATD829	FAMILY FINANCES	9.95
ATD511	FINANCIAL COOKBOOK	13.50
ATD717	FINANCIAL STRATEGIES	19.95
ATD679	FORMS DISK PREDEF.FORMS	13.50
ATD678	FORMS GENERATOR	21.50
ATD274	HOME ACCOUNTANT	19.95
ATD828	HOME FILING MANAGER	9.95
ATD604	HOME INVENTORY	17.95
ATD386	HOME MANAGER KIT	12.95
ATD323	HOMEPAK (REMOVE BASIC)	24.95
ATD682	INSTANT ALPHABETIZER	13.50
ATD272	INVENTORY MASTER	80.95
ATD865	LABEL MASTER/ COL.LISTER	9.95
ATD385	MAILING LIST (ATARI)	9.95
ATD680	MAILING LIST PLUS	13.50
ATD485	MEGAFILER	17.95
ATD487	MONEY MANAGER TIMEWORKS	8.95
ATD586	NETWORTH	17.95
ATD685	PERSONAL APPOINTMENT	13.50
ATD842	SILENT BUTLER (1050)	14.95
ATD864	SMALL BUSINESS SYSTEM	34.95
ATD832	STOCK ANALYSIS	9.95
ATD833	STOCK CHARTING	9.95
ATD329	SUPER MAILER PLUS	35.95
ATD784	SYNCALC - 130XE VERSION	44.95
ATD513	SYNCHRON	14.95
ATD850	SYNCOMM	9.95
ATD785	SYNFILE +	44.95
ATD514	SYNTREND	19.95
ATD725	TELE COM	14.95
ATD688	TELEPHONE MASTER	13.50
ATD838	TIMEWISE	9.95
ATD277	VISICALC	29.95
ATD504	SUPER MERGER	8.95

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ATD878	FLASH BACK	26.95
ATD555	PROTECTION TECH ADV.	22.50
ATD498	SCANALYZER	26.95
ATD554	SCHEMATIC DESIGNER	22.50
ATD552	CHEAT	22.50
ATD276	DISKIO	29.95
ATD369	DO DISK	6.35
ATD497	GENIE (RAM RES UTILITY)	26.95
ATD503	IMPERSONATOR	26.95
ATD597	MAKEBOOT	22.50
ATD579	MONKEY WRENCH II	29.95
ATD221	PHANTOM SECT MAKER 1050	53.95
ATD222	PHANTOM SECT MAKER 1050	44.95
ATD732	SUPER REEVEKEY	17.95
ATD501	TACH MASTER	9.95

PROGRAMMING LANGUAGES

ATD305	ACTION!	59.95
ATD598	BASIC ARCADE GRAPH DESGN	19.95
ATD502	BASIC TURBOCHARGER	22.50
ATD308	BASIC XE	59.95
ATD307	BASIC XL	59.95
ATD747	CLSN PASCAL	35.95
ATD818	EDITOR/MACRO ASSEM ELCOMP	19.95
ATD819	FORTH (ELCOMP)	14.95
ATD311	LIGHTSPEED C	35.95
ATC079	LOGO CART W/ MANUALS	19.95
ATD313	MAC/65	59.95
ATD315	MACRO ASSEMBLER	17.95
ATC076	MICROSOFT BASIC II	29.95
ATD316	PILOT PROGRAMMING LANG.	14.95

OPERATING SYSTEMS

ATD848	DOS 2.0 DISK	5.00
ATD830	DOS 2.0 DISK & MANUAL	10.00
ATD841	DOS 2.5 DISK	5.00
ATD840	DOS 2.5 DISK & MANUAL	10.00
ATD844	DOS XE DISK & MANUAL	10.00
ATD583	SPARTA DOS CONST SET	19.95
ATD261	SPARTA DOS X (ON CART)	55.95
ATD490	TOP DOS 1.5	17.95
ATD491	TOP DOS 1.5 PLUS	26.95
ATD866	TOP DOS PROFESSIONAL	44.95
ATD815	CASSETTE OPERATING SYS.	19.95

EDUCATIONAL DISK

ATD209	10 LITTLE ROBOTS	26.95
ATD111	A+ BIOLOGY	17.95
ATD107	A+ FRENCH	17.95
ATD117	A+ LEARN TO READ	35.95
ATD108	A+ SCIENCE GRADE 3-4	17.95
ATD284	A+ SCIENCE GRADE 5-6	17.95
ATD064	A+ SCIENCE GRADE 7-8	17.95
ATD109	A+ SPANISH	17.95
ATD281	A+ SPELLING	35.95
ATD282	A+ U.S. GEOGRAPHY	17.95
ATD115	A+ U.S. GOVERNMENT	17.95
ATD283	A+ U.S. HISTORY	17.95
ATD118	A+ VOCABULARY	17.95
ATD110	A+ WORLD GEOGRAPHY	17.95
ATD120	A+ WORLD HISTORY	17.95
ATD690	AEC LEARN ABOUT WORDS 2	9.95
ATD691	AEC READING COMP. SKILLS	9.95
ATD695	AEC SPELLING GRADE 2	9.95
ATD940	AEC SPELLING GRADE 3	9.95
ATD693	AEC SPELLING GRADE 4	9.95
ATD696	AEC SPELLING GRADE 5	9.95
ATD692	AEC SPELLING GRADE 6	9.95
ATD694	AEC SPELLING GRADE 7	9.95
ATD642	ARDY THE AARDVARK	9.95
ATD208	BIG BIRD'S SPECIAL DELIV	8.95
ATD238	BRAIN STRAINERS	9.95
ATD121	BUZZWORD	22.50
ATD032	CARDIO QUIZ	17.95
ATD790	COLORASAURUS	7.95
ATD699	CONDENSATION	9.95

Cartridge Software 8-Bit Computers. 800, XL, XE

Game Cartridges

ATC164	AIRBALL (XL/XE)	64K	24.95
ATC149	BARNYARD BLASTER	48K	14.95
ATC156	CHOPLIFTER! ATARI VERS.	64K	19.95
ATC162	CRIME BUSTER (LIGHT GUN)	64K	24.95
ATC150	CROSSBOW (LIGHT GUN)	64K	19.95
ATC160	CRYSTAL CASTLES (XL/XE)	64K	19.95
ATC171	DEMON ATTACK	16K	14.95
ATC148	FIGHT NIGHT	64K	19.95
ATC038	FROGGER	16K	14.95
ATC147	HARDBALL!	64K	19.95
ATC166	INTO THE EAGLE'S NEST	64K	19.95
ATC018	K-RAZY ANTIKS	16K	14.95
ATC017	K-STAR PATROL	16K	14.95
ATC155	KARATEKA	64K	19.95
ATC161	MARIO BROTHERS	64K	19.95
ATC073	MINER 2049'ER	16K	29.95
ATC002	MOUNTAIN KING	16K	17.95
ATC128	MS PAC-MAN	16K	19.95
ATC119	POLE POSITION	16K	19.95
ATC039	POPEYE	16K	14.95
ATC068	Q-BERT	16K	14.95
ATC043	RETURN OF THE JEDI	16K	14.95
ATC157	SUMMER GAMES	64K	24.95
ATC165	THUNDERFOX	64K	19.95

Educational on Cartridge

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ATC053	ALPHABET ZOO	9.95
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ATC100	ASTEROIDS		ATC118	ROBOTRON: 2084
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ATC011	ATLANTIS		ATC094	SPACE INVADERS
ATC091	BASKETBALL		ATC033	SPACE JOURNEY
ATC111	CAVERNS OF MARS		ATC177	SPIDER CITY
ATC110	CENTIPEDE		ATC025	SPRINGER
ATC023	CHICKEN (NO XL/XE)		ATC096	STAR RAIDERS
ATC015	CLAIM JUMPER		ATC092	SUPER BREAKOUT
ATC009	CLOUDBURST		ATC127	TENNIS REALSPORTS
ATC172	CONGO BONGO		ATC067	TOPPER
ATC047	DECATHLON		ATC029	TURMOIL
ATC106	DEFENDER		ATC028	WIZARD OF WOR
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ATC141	BATTLEZONE
ATC144	BLUE MAX
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ATC163	NECROMANCER
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ATC518	FLIGHT SIMULATOR II
ATC143	FOOD FIGHT
ATC152	GATO
ATC145	LODE RUNNER
ATC154	ONE ON ONE BASKETBALL
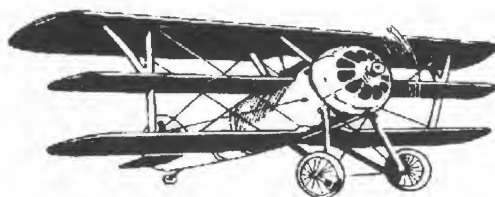
Cartridges No Box No Documentation

Cartridge only $5.00

ATC180	3D TIC TAC TO	16K
ATC169	ABRACADABRA	16K
ATC183	ACE OF ACES	64K
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ATC182	ASTEROIDS	16K
ATC021	ATARILAB TEMP	16K
ATC186	BALL BLAZER	48K
ATC086	BASIC REV A	16K
ATC187	BATTLEZONE	48K
ATC188	BLUE MAX	48K
ATC189	BUG HUNT (LIGHT G)	
ATC190	CENTIPEDE	16K
ATC197	DAVID MID MAG	64K
ATC175	DECATHALON	16K
ATC195	DEFENDER	16K
ATC192	DEMO IN STORE	16K
ATC193	DEMO XL/XE GAMES	64K
ATC196	DESERT FALCON	64K
ATC198	DONKEY KNG JR	16K
ATC117	DONKEY KONG	16K
ATC125	EASTERN FRONT	16K
ATC199	ET PHONE HOME	16K
ATC202	FLIGHT SIM II	64K
ATC200	FOOD FIGHT	64K
ATC201	FOOTBALL	16K
ATC204	GALAXIAN	16K
ATC203	GATO	64K
ATC205	GORF	16K
ATC206	HARDBALL	64K
ATC207	JAWBREAKER	16K
ATC208	JOUST	16K
ATC209	JUNGLE HUNT	16K

ATC210	KARATEKA	64K
ATC212	LODE RUNNER	64K
ATC099	MISSILE COMM	16K
ATC213	MOON PATROL	16K
ATC218	NECROMANCER	48K
ATC215	ONE ON ONE	64K
ATC170	OZZY'S ORCHRD	16K
ATC105	PAC MAN	16K
ATC103	PILOT LANG	16K
ATC216	SKY WRITER	16K
ATC217	SPACE INVADRS	16K
ATC097	STAR RAIDERS	16K
ATC219	SUPER BREAKOUT	16K
ATC101	TELELINK I	16K
ATC102	TELELINK II	16K
ATC221	TENNIS	16K
ATC220	TRACK & FIELD	16K

Cartridge only $9.95

ATC185	BARNYARD BLAST(LG)	48K
ATC191	CHOPLIFTER	64K
ATC168	FANTASTIC VOY	16K
ATC224	FIGHT NIGHT	64K
ATC080	LOGO	16K
ATC129	MS PAC MAN	16K
ATC075	SUPER PAC MAN	16K
ATC090	ASSEMBLR ED B	16K
ATC135	ATARI ARTIST	16K

Cartridge only

ATC121	ATARIWRITER A	20.00
ATC123	ATARIWRITER C	15.00
ATC087	BASIC REV C	15.00
ATC078	MICROSOFT II	20.00

New screen fonts for AtariWriter+ 　　　　　　　Paul V. Alhart

Welcome to the New *Atari Classics*. I trust you are happy to find your favorite column, **A-T-A-R-I**, is still here. I have been writing the column using my trusty word processor for so many years now, that it just seems natural. But it wasn't always that way.

Back in the early '80s I wasn't even sure what a word processor was. I knew about food processors from ads on TV, but couldn't relate to word processors. Then I bought my first computer. A shiny new Atari 1200XL complete with the AtariWriter cartridge. It wasn't long before I wondered how I ever got through school without a word processor. My friends just wondered how I got through school at all. Come to think of it, we didn't have calculators, spell checkers, or microwave popcorn when I went to school either, but that's a whole 'nother story. I learned all about the wonders and trials of word processing on the trusty old AtariWriter cartridge. It wasn't till a few years later when our User Group held a "Word Processing Night" that I learned about some of the newer word processors available for the Atari. I tried most of them, but with AtariWriter as comfortable as an old shoe, I resisted change for some time. The addition of a new (non-Atari) printer to my system signaled the beginning of a change though. This new printer had so many neat new features and I wanted to use them all. The minute I got the printer home, I plugged it in and booted AtariWriter only to find that my new printer wasn't listed on the printer menu. I quickly learned all about the "Control O" codes, as well as the hassle of having to use them all the time.

AtariWriter+ To The Rescue

The logical move for me, was straight to AtariWriter+ since most of the editing and formatting commands were exactly the same as those used by my friendly old AW cartridge. AW+ also had several added features as well as a spelling checker that I really needed. Best of all, it allowed me to create my own custom printer driver that could access all those neat functions of my new printer. I have been using AtariWriter+ ever since.

Another advantage of AtariWriter+ is that it is disk based. This means that unlike the old AtariWriter cartridge, it is much easier to change the code and make custom modifications to the program. This month I am pleased to present two short type-in programs that will allow you to replace the character set used by AW+ with any standard 9 sector character set.

NOTE: These programs are for the 48K version of AW+ only and will not work with AW+130 or the 80 column version.

For even more fun, create your own custom character set using one of the many font editors available for the Atari.

What A Character!

A little background is in order. The character set we are talking about is the one you see on your monitor or TV screen and has no effect on what is saved to disk or sent to your printer. AW+ uses a redefined character set. This means that the standard Atari character set you see when your computer is first turned on is replaced by AW+ with its own custom character set. Figure 1 shows the standard Atari character set as well as the redefined set AW+ uses. Note that the only changes AW+ makes to the original character set are found in row three. The Atari graphic characters are replaced

Figure 1

with the characters AW+ uses to mark editing commands such as paragraphs and carriage returns.

With the following type-in programs and a font editor you can change any or all of the 128 characters to suit your own taste. I personally like the standard Atari text characters but found the editing command characters of row three too hard to spot in a long document. I redrew these characters to take advantage of artifacting. Now all my editing commands are reddish gold and easy to spot.

Although the AW+ disk is copy protected, the file we want to modify (AP.OBJ) is a standard disk file that we can work with. *It is important to make a back-up of this file.* If something should go wrong, copy the back-up to your original AW+ disk and you are back to square one.

Let's Get Going

Step 1: Make two backup copies of the file AP.OBJ and put them away in a safe place.

Step 2: Make another copy of the file AP.OBJ to a freshly formatted work disk that also contains DOS. Any DOS that supports the standard Atari NOTE/POINT functions will do. If in doubt use Atari DOS 2.0 or 2.5.

Step 3: Type in the two short BASIC programs (AWF.GET and AWF.PUT) and save them to your work disk.

Step 4: RUN the AWF.GET program. This program reads the redefined character set contained in AP.OBJ and uses the information to create a 9 sector font file called AWP.FNT.

Step 5: Use a font editor to customize this character set or just re-

place it with your favorite 9 sector font file. Be sure your new customized character set is saved back to the work disk with the file name, AWP.FNT

Step 6: RUN the AWF.PUT program. This program will install your new character set into AP.OBJ.

Step 7: Copy this modified AP.OBJ file from your work disk back to your original AW+ disk. NOTE: Your original AW+ disk can *not* be Write Protected for step 7 to succeed.

Step 8: Reboot your system using your now modified AW+ and enjoy.

If something went wrong or you just don't like the results, copy one of those back-ups of AP.OBJ to your AW+ disk. This will restore your AW+ disk to its original condition.

```
1 REM AtariWRITER+ FONT GETTER
2 REM by: PAUL V. ALHART
3 REM
4 REM
10 TRAP 130
20 OPEN #1,4,0,"D:AP.OBJ"
30 FOR I=1 TO 277:GET #1,A:NEXT I
40 OPEN #2,8,0,"D:AWP.FNT"
50 FOR I=1 TO 512:GET #1,A:PUT #2,A:NEXT I
60 NOTE #1,Q,W
70 FOR I=1 TO 260:GET #1,A:NEXT I
80 FOR I=1 TO 256:GET #1,A:PUT #2,A:NEXT I
90 NOTE #1,E,R
100 POINT #1,Q,W
110 FOR I=1 TO 256:GET #1,A:PUT #2,A:NEXT I
120 POINT #1,E,R
130 CLOSE #1:CLOSE #2
```

```
1 REM AtariWRITER+ FONT PUTTER
2 REM by: PAUL V. ALHART
3 REM
4 REM
10 TRAP 180
20 OPEN #1,12,0,"D:AP.OBJ"
30 FOR I=1 TO 19:GET #1,A:NEXT I
40 GET #1,A:GET #1,B:IF A<>255 OR B<>39 THEN
? "NEED AtariWriter+ (48K VERSION)":GOTO 180
50 NOTE #1,E,R
60 FOR I=1 TO 256:GET #1,A:NEXT I
70 OPEN #2,4,0,"D:AWP.FNT"
80 FOR I=1 TO 512:GET #2,A:PUT #1,A:NEXT I
90 NOTE #2,Q,W
100 FOR I=1 TO 256:GET #2,A:NEXT I
110 FOR I=1 TO 256:GET #2,A:PUT #1,A:NEXT I
120 POINT #2,Q,W
130 FOR I=1 TO 4:GET #1,A:NEXT I
140 FOR I=1 TO 256:GET #2,A:PUT #1,A:NEXT I
150 NOTE #1,T,Y
160 POINT #1,E,R:POINT #2,Q,W
170 FOR I=1 TO 256:GET #2,A:PUT #1,A:NEXT I
180 CLOSE #1:CLOSE #2
```
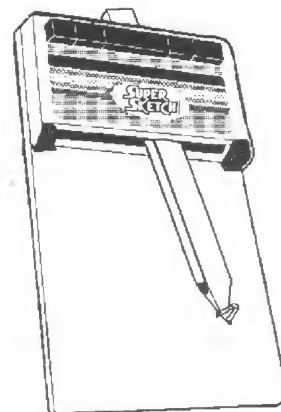
PRINTER PRIMER

CHARLES COLE

the different graphics commands between 9- and 24-pin machines, 24-pin printers squash the characters and leave a horizontal white streak between head passes. Straight graphics on a 24-pin printer produce the same results. For instance, if you try to print a Koala picture with one of the graphic dump programs, a white streak is left across the page between each head pass, and the picture gets compressed vertically. A similar problem exists, to a much lesser extent, with a 9-pin printer when you convert a Print Shop icon to Daisy Dots III format if you don't reset the character spacing to zero; however, in this case, the white streaks run vertically through the icons, not horizontally.

Using a 24-pin printer in 9-pin emulation mode to print with Daisy Dots III, Print Shop, Newsroom, etc., can cause premature and uneven wear of nine of the printhead's pins, which could ultimately result in poor quality 24-pin printing.

Q. Kamikaze Komputers is having a blowout sale on printers. Which ones work with my 8-bit?

From information I have been able to glean and personal experience, 24-pin dot matrix printers work OK with our Atari 8-bit machines as long as you only want to do straight text with the printer's built-in type fonts. In that situation the print pins are controlled by the printer's internal CPU to form their characters, not by the word processor; therefore, they are OK for use with AtariWriter Plus, Paper Clip, Text Pro, 1st Xlent Word Processor, etc. The Epson LX printer driver should work with any of them.

These printers will *not*, however, work properly with Daisy Dots, Print Shop, Billboard, or other "text processors" that use a printer's graphics mode to print text unless they are fully Epson LX, FX, or MX compatible, and you cannot download external fonts to them, because their command set and paper advance commands are different than those of a 9-pin printer.

This is what Ben Poehland referred to in his Dream Street column in *Atari Classics* when he stated that we need a Daisy Dots program with "correct aspect ratio" for a 24-pin printer. Daisy Dots uses a printer's graphics mode. Because of

Information received from Jeff McWilliams indicates that the Epson Stylus 800 ink jet printer suffers from the same printing problems when used with an Atari machine.

The Epson literature indicates that it has four scalable fonts; however, these can be used only with a straight word processor program that can send control codes to the printer, and the automatic line centering commands such as those in AtariWriter Plus (CTRL-C) will *not* automatically center scalable fonts. This is something that has to be calculated manually for each centered line, based on the size of the characters. In short, a real hit-and-miss affair.

The Stylus will not do graphics, either (at least not on an 8-bit Atari). Another quirk of the Stylus is a 61-lines-per-page limitation instead of the normal 66 lines with other printers. This is due to the Stylus using cut sheets, which need extra margin at the top and bottom for the paper handling mechanism.

Needless to say, it will not work with any of the graphics text processors, such as Daisy Dots, and you cannot download additional fonts to it, either.

Another problem with scalable fonts is that they also expand vertically, and cut down on the number of lines per page. Atari word processors are not going to realize this, however, and will still count a line printed in 36-point type as only one page line, instead of three. This throws the page break way off if you have a lot of these lines on a page.

Bob Woolley says the original HP DeskJet and the DeskJet Plus (but *not* the current DeskJet 500 series) can emulate an Epson FX-80 using the HP plug-in cartridge 22707F. This gives very close to Epson eqivalent output with the exception of placement. Unfortunately, DeskJets cannot print within $1/2$ inch of the bottom of the page which may affect your output format. In PrintShop, for example, the last few lines of the border fall off the bottom of the page and end up on the next sheet. You can work around this by using 14 inch long (legal sized) paper and trimming it back to 11 inches. Otherwise, the output matches Epson text and graphics exactly.

One of the newest laser printers, the Sharp JX-9400, priced at only $479 at Max Club and by various mail-order sources that advertise in Computer Shopper, is fully Epson FX-80 compatible and will print properly with any Atari 8-bit program that is designed to print to an Epson compatible dot-matrix printer. This printer also offers HP PCL 4, IBM ProPrinter, IBM Graphics Printer, and Diablo 630/630 ECS emulations, and can even be connected through a switchbox to more than one computer (as can any other printer).

This printer counts a full page as 63 lines, so your word processor's top and bottom margins must be reset accordingly. With Daisy-Dots III, this means shortening the page length setting by at least 36/72" so your page breaks will come out correctly. This is the only adjustment that needs to be made to switch from a 9-pin dot-matrix printer to the Sharp JX-9400.

Charles A. Cole
Sierra Vista, AZ
CIS: 73217,2321
GEnie: C.COLE1

65816 = Speed

The Beginning

It's strange how things really get started in this world. Here I am, walking down the aisle in my local electronics supermarket (that's what we have out here in Silicon Valley instead of Malls...) and a display jumped out at me — 128Kx8 25ns Static RAMs - $27.00. Wow, that's cheap! I always assumed that cache RAMs that size would be out of sight, so I have never priced them. Guess the PC guys use plenty of these things, which drives down the cost... That started me thinking about what I could do with really fast 128K SRAMs.

The other chapter of this story came from a message left on CompuServ by one of the 8-bitters. He was asking Bob Puff, of CSS, about speeding up the 6502 in our machine for better performance. I replied with an idea that Bob should make up a bunch of these high speed 8-bits for all the people interested in them. Bob's answer was for me to send him the second unit I finished — which, at the time, was not a serious proposition. But, considering the SRAM availability and the user interest in this type of upgrade, I have begun to develop a high speed hack in earnest. I won't hold Bob to his participation, but a couple of dozen letters from people waving credit cards might carry some influence with CSS (grin). See, two unrelated incidents got this whole thing started... wheels within wheels...

The Plan

So, just what have I started here? Just about every 8-bit user at some time or other has wished that his machine ran just a little faster. Maybe a *lot* faster.

Various techniques have been developed to save time or increase program speed: turning off the screen, using machine language in BASIC, re-coding the Operating System — bunches of hacks. None of them actually address the clock speed of the Atari. And, for good reason; fooling around with the clock is very difficult to do in your attic.

Sure, if we were Intel or Motorola, we could just whip up a bunch of 90mhz chips and slap them on a multi-layer printed circuit board with transmission line quality ground planes and the latest SMD technology. After a careful search, I failed to find those kinds of tools in *my* attic.
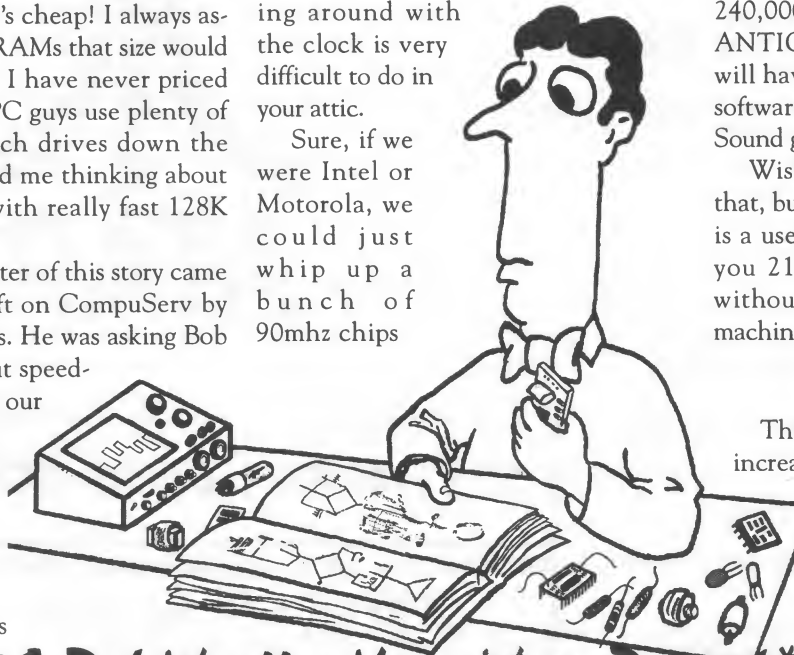
Anyway, increasing the clock speed of the 6502 in your 8-bit would do wonders for your system's performance without requiring new software or any of those nasty compatability problems.

The Result

The current clock speed is 1.79 mhz, which allows approximately 30,000 6502 clock cycles per video frame. The ANTIC chip in your 8-bit "steals" 10,000 clock cycles in every frame to generate his video, so the 6502 is left with 20,000 to do computing things with. This means that you can turn off ANTIC and get back almost 10,000 cycles per frame (but you now have a blank screen...).

What I am going to discuss is a hack that runs at 14.36 mhz; eight times the clock speed of your 6502. That's 240,000 clock cycles per frame. With ANTIC taking his 10,000 cycles, you will have 230,000 left for your favorite software, 10 times what you have now! Sound good? Sure it does!

Wish we could do something like that, but we can't. What we *can* explore is a useful modification that will give you 210,000 more cycles per frame without a lot of changes inside your machine.

The Issues

The issues surrounding a project to increase your clock speed deal mostly with the buss and the interface to the other chips in your computer.

Let's look at the buss first. The printed circuit board (PCB) in your Atari is designed to run at 1.79 mhz. I took a 600XL PCB (these 600XL boards are great to experiment with) and pulled all the chips out of it with the exception of the OS ROM and the CPU. I was going to see how the buss would act at higher speeds, starting with a 3.58 mhz clock. Looked pretty good. Add another chip. Not so good. Add a third chip and you no longer have a viable circuit. The nice little square signals get all squished and rounded.

This is the normal result when you add more chips to an inadequate buss, the signal quality goes to heck. No way to run the existing buss at higher speeds, regardless of the quality of chips used.

You might think to run the board at just a 50% increase (2.68 mhz) instead of a 100% increase, but any clock

A Bob Woolley VaporWare Project*

change must be a 2x multiple of the original frequency or you won't be able to hook it up to your monitor. This is why the PAL computers need different clock speeds; their monitors run at a different rate than ours.

No question then. Anything running at high speed has to be on it's own PCB, one designed to run over 1.79 mhz. This means that we can't use the memory, ROMs, or the logic chips already in our computers for the new CPU unless we kick the clock back down to 1.79 mhz.

The other issue is the limited clock speed of the custom chips in our 8-bits. Of major importance are the ANTIC/GTIA pair and the POKEY chip. These are chips designed specifically for the Atari computers. We can get much, much faster logic chips, memory and even make a faster 6502, but we can't make a 14.36 mhz ANTIC. Here again, when we talk to these chips, we have to kick back down to 1.79 mhz — even if we build a new PCB that runs at 14 mhz.

So, we need to do two things: build a separate PCB and put *all* the high speed electronics on the new board. This is not going to be easy — maybe that's why none have been produced yet. Let's continue.

The Method

The basic principle in cranking up the clock is to share system memory between a new 65816 CPU and the rest of your Atari.

Take a look at the Aux Processor Clock Timing figure. The top line repre-sents the 65816 CPU clock synchronized with the bottom line, the system clock. There are eight CPU cycles, designated 0-7, for each system cycle. In the course of any cycle, the memory address is placed on the buss for the full cycle. This gives the memory time to select the cells that hold the data. At the end of the cycle, the data is either read from the buss if reading, or written into the memory cell if writing.

The key point is that all data transfers really take place at the end of the cycle. Everything up to that point is just setting up addresses.

Now, if we use really fast memory, we can get in and out of memory many times during the 6502 cycle. The normal 8-bit memory takes 200ns to set up addresses out of a cycle of 280ns (it can only be active on the last half of the cycle).

Works fine at 1.79 mhz. The cache SRAM I saw runs at 25ns - out of a 35 ns cycle. Plenty of time! The 65816 can go to memory 7 times while the 6502 is setting up addresses. On the 8th cycle, we gate the 6502 onto the buss and let him use memory for one cycle.

Everybody is happy. The 6502 has no idea that he is sharing his memory!

Now, one more point. Notice that I talk about the 6502 *and* the 65816? Aren't we going to replace the 6502? Well….

You can replace the 6502, but it isn't easy. If you make the 65816 drive the other chips (ANTIC, POKEY, etc.), you have to include circuits to get everybody in sync.

Look at the timing chart. Suppose you are going to STA some data in ANTIC in cycle 3. You not only have to stretch out the clock to 1.79 mhz, but you have to wait until the longer clock is in sync with the 6502 clock. You need to check for this condition (slowing down and syncing) on *every* 65816 clock cycle. This takes time… And we only have about 20ns to do this checking (along with our normal "where am I" logic stuff).

It could be done, but I think it is beyond the scope of *my* attic. Instead, why not just use an auxillary 65816 processor and leave the 6502 alone?

The 8-bit can just tool along like nothing is happening. The 6502 will do all the interrupts, run ANTIC, POKEY and all those guys. In fact, without a specific intent, the computer runs exactly the way it ran before the upgrade. This insures compatability with all the existing software.

Unfortunately, it also means that without a change, the software will also run just as slowly as before. This is not as bad as it seems. What purpose would there be in running Pole Position at light speed?
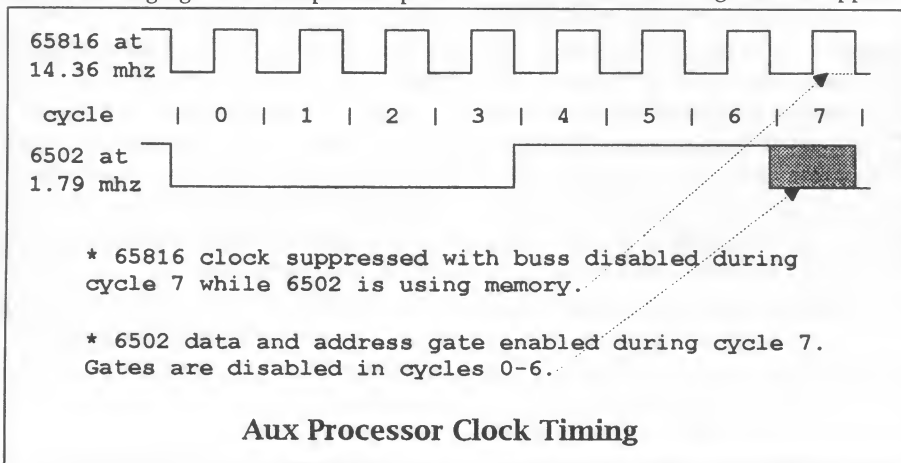
We can make modifications to things like the OS to speed it up independently of the software, as well as BASIC and other tools. And, of course, we can write new routines that run in the '816 very quickly.

The Details

Ok, how would this work? Take a look at the Aux Processor diagram. One advantage in using a second processor is that the only signal needed that is *not* on the PBI buss is the 3.58 mhz clock for the 6502.

This means that anyone who might want to produce this type of upgrade can plug it into the PBI instead of requiring six zillion wires inside the computer. Sadly, the computer *will* need to be opened to add the one 3.58 mhz clock line. Otherwise, the 6502 buss is connected to data and address gates that are active during clock cycle 7.

Internal RAM is disabled entirely (uh-oh, no RAMBO?). See the block marked Bank Addr Latch? The SRAM

* 65816 clock suppressed with buss disabled during cycle 7 while 6502 is using memory.

* 6502 data and address gate enabled during cycle 7. Gates are disabled in cycles 0-6.

Aux Processor Clock Timing

is 128K. This latch sets which half of the bank is selected during access. It is set by the 65816 on each '816 cycle, giving the '816 a 128K linear address space. Of this space, 64K "belongs" to the 6502 for his use. The other 64K is where the '816 routines (that you write) will be executed.

For example, you want to move a block of data from $4000 to $6000 in the 6502. You could have a routine up in $012000 in the 65816 memory that does just this. Just point the '816 at the addresses and "tell" him to do it. Nothing takes up 6502 memory and the 6502 just waits while the 65816 runs the routine at super high speed in his own memory bank.

Even the Zero Page and Stack for the '816 are in the $01000 bank! Any interrupts that occur during the routine will be handled concurrently by the 6502 while the '816 keeps on movin'.

One application that also comes to mind in using the two banks is a hard switch. Since the 6502 can use either bank for it's memory, an external switch can be used to "flip" the 6502 into the other bank. If this is done in conjunction with an NMI, the entire memory space as well as the PC will be preserved in the SRAM. Sort of an instantaneous snapshot that you can return to with an RTI and another bank switch.

This would make a super development system! You could bank out of the 6502, look at everything in the system and return when you were finished without changing a single byte.

There are a few things missing in that last explanation. Like, just how do we tell the 65816 to do something for us? How do we get the code into the '816 address space?

The 65816 is inactive after reset while the 6502 goes thru his normal bootup. At this point, the 6502 is using one of the two 64K banks in the SRAM. Doesn't matter here which one, since the '816 is not cycling.

The normal configuration should be for the 6502 to use $00000 thru $00FFFF (bank 0), but reset does not affect the 6502 bank register, so the 6502 could be in either bank after a reset.
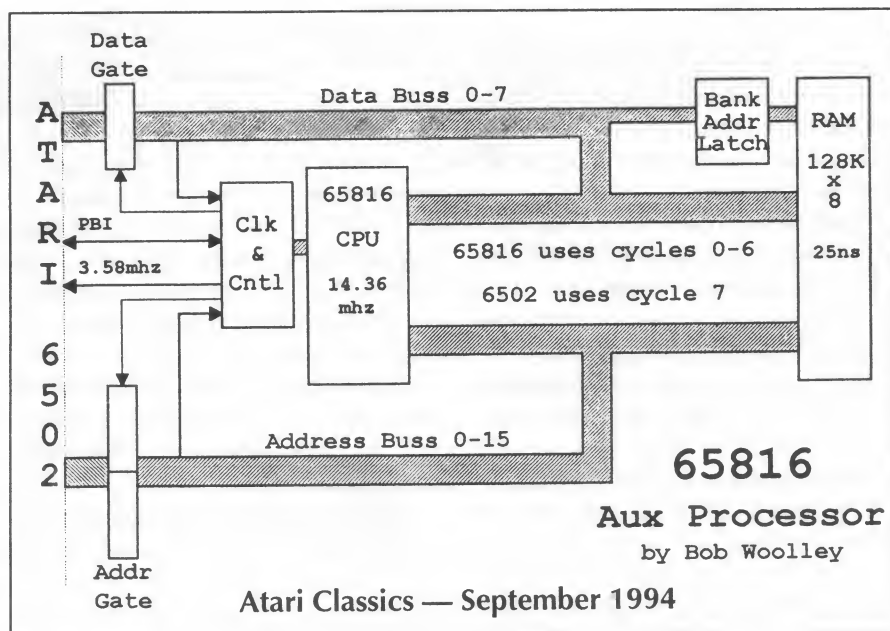
From power on we would want to start the 6502 in bank 1 so we can load the 65816 code (we need to designate a block of control addresses to control banking — let's pick $D600).

When we first boot the 6502, store $01 in the bank register at $D600. If the system goes out to lunch, then we must have been in bank 0. Just hit reset and re-boot. We are now in bank 1. From here, we need to load the SRAM at $01xxxx with the reset code for the '816.

To the 6502, it will mean setting the OS space as RAM and storing the '816 code up there. Now, when we start the '816, he will see code up in $01xxxx that he will use to manage your 6502 requests. The 6502 can then store $00 into $D600 and return to bank 0 after he starts the '816. Your 65816 code will stay out of bank 0 until the 6502 asks for help.

To execute a 65816 routine, the 6502 can use $D7xx addresses (neither $D6xx nor $D7xx are normally active in the 8-bit, so no other program will try to use it). The '816 can watch location $D700, as an example. If it is $00, then do nothing. The 6502 might then store $04 in $D700, meaning: 4 parameters are now present for execution, the first is the address of your 65816 routine. The '816, when he sees this value would invert the $04 to $FB, indicating he accepted the request and is busy. When

the '816 finishes his task, he will zero the flag at $D700, indicating he is not busy.

The 6502 can therefore go off and do whatever he wants without waiting for the '816 to signal completion. If the 6502 wants the '816 to run more routines, he can just check $D700 for $00.

Seems fairly simple, doesn't it? It can be very powerful, though. Put the math chip routines from the OS in the '816 where they will execute at high speed and a lot of software will get supercharged.

The End Of The Beginning

Sound like something you would be interested in? I've been going here for quite a while now. It's time for you users out there to say your piece. Sometimes writing an article like this gives the author the impression that he's talking to himself. Take a few minutes and send you opinions to AC. Tell us what you would like to see this project grow into.

I'd hate to think that only two of these will ever get built, one for me and one for Bob Puff, just because they don't meet *your* needs. I don't want to hear about Pentium projects and 64 megs of memory — try to stay within the scope of the design, OK?

See you next issue!

Bob

Data Gate

Data Buss 0-7

Bank Addr Latch

RAM 128K x 8 25ns

ATARI 6502

PBI
3.58mhz

Clk & Cntl

65816 CPU 14.36 mhz

65816 uses cycles 0-6
6502 uses cycle 7

Address Buss 0-15

65816
Aux Processor
by Bob Woolley

Atari Classics — September 1994

Addr Gate

ATARI 8-BIT SUPPORT FROM RICHARD GORE

ARENA The full 50 level version of the excellent puzzle game that was a demo bonus on
Page 6's issue 66 disk.   Price: £5 ($10) XL/XE Disk only.

BUBBLE ZONE A fast blast em set on a grid being invaded by ever expanding bubbles.
Collect the tokens and see how far you can advance.   Price: £5 ($10) XL/XE Disk only.

JAWBREAKER Classic maze game based on Pac-Man, munch the sweets but don't forget that
dental hygene! Two different mazes supplied which were originally separate games.

MOUSEKATTACK Another classic maze game, but this one involves you plumbing all the
levels of Rat Alley. Addictive arcade action with a simultaneous two player mode.

   Jawbreaker and Mousekattack are available separately for only £4.50 ($8) each or as a
double pack for only **£6.95** ($13). They are available on disk, tape and Rambit
turbo tape, please state which when ordering.

GATO High quality submarine simulation. Supplied shrink wrapped in their original
packaging. Limited stocks priced at £6.95 ($14) on ROM cartridge.

   YORKY 256K plug in memory upgrade with manual and support disk. Very few
units left. Hurry this could be your last chance!
 Price: £50 ($90)   +p&p (UK £2, EC £3.50, world £5)

Thanks to a bulk purchase I am able to offer the following disk software titles for
£4.75 ($10) each, any two for £8.50 ($17) or any three for £13 ($26). Stocks are
limited and may not be replaced and are offered on a first come first served basis.

GORF - classic Space Invaders clone. XL/XEs require a translator disk.

HALLEY PATROL - a must for any astrology fan, enables you to chart Halley's comet (past
and present). Also includes a descriptive slide show.

SILENT SERVICE - top class submarine simulation, great graphics.

SUMMER GAMES - take your Atari to the Olympics, great fun.

TAXICAB HILL - classic game, you take contol of a taxi, accept the phone calls and
collect your fares but watch out for other traffic.

WINTER CHALLENGE - US release of Tynesoft's Winter Olympiad. Fantastic graphics winter
sports simulation.

All software prices include p&p to UK, overseas please add £2 per order unless
otherwise quoted. Payment by cash, cheque (payable to Richard Gore) or IMO. Prices in
dollars are for USA customers and include shipping but payment must be in US dollars
cash, preferably using registered post! You may order from:-

RICHARD GORE, 79 SPROTBROUGH ROAD, SPROTBROUGH, DONCASTER, DN5 8BW, ENGLAND

Plus coming soon..... new software from Germany, a Replay compatible sample sequencer
and much more. Keep in touch for the details.

SPECIAL NOTE Will Bill Kendrick (kendrick@vax.sonoma.edu) and Mr Slackey
(slackey@lightstream.com) please get in touch with me at the above address with regards
to the software we were discussing in June.

I am engaged in writing a BBS program for my A level project; a decision I am beginning to regret. While trawling through all my Public Domain BBS and Terminal programs, for inspiration, I noticed they all had one thing in common; a line or two along the top or bottom of the screen which held various pertinent information and was unaffected by scrolling. In other words a status line.

My original thought was to produce a 24 line screen with the top two lines protected from scrolling. I spent an entire Sunday trying to achieve this. I managed to protect the top two lines but I could not persuade the system to scroll only 22 lines worth of information. It insisted on inventing an extra two lines of info off the bottom of the screen (usually the actual program listing) which scrolled into the wanted information. Aaarrggghh! Finally a solution struck me; leave the 24 line screen alone and tag on an extra two lines with a custom display list (CDL).

good reason. The screen memory is located just below RAMTOP and when the computer performs a "clear screen" all the memory from the start of the screen to RAMTOP is reset. However, because the ROM usually occurs above RAMTOP and this information cannot be altered, the "clear screen" function is a bit slapdash and will wander past the official RAMTOP. I am reliably imformed that this occurs by a maximun of 64 bytes but I shall leave a whole page as padding. Location 106 is updated in relation to location 740 to prevent your memory being eaten away, two pages at a time, if you run the subroutine more than once without a poweroff.

Line 9040 defines **DL** which holds the address of the start of our CDL, one page above RAMTOP.

Lines 9060 to 9090 poke the CDL into this final page of memory.

Lines 9100 to 9140 poke various address information into the CDL. More about this later.

Line 9550 changes the pointers at locations 88 and 89 to tell the system that the screen memory now starts 50 bytes after the start of our new display list. As we only need 80 bytes for our two status lines there is plenty of room.

Line 9560 CLEARs out this area and makes sure that the cursor is POSITIONed at the start of the area.

Line 9670 simply prints **SL$** into this area.

Line 9680 restores the pointers at locations 88 and 89 back to the normal 24 line screen area.

Finally, at line 9690 the normal 24 line screen area is CLEARed and the cursor set to the start of this screen. When **SL$** was PRINTed to the status line the markers indicating the cursor location were still updated and consequently when you return PRINTing to the normal screen area the POSITION of the cursor can be a little unpredictable. I therefore find it easiest to reset the screen.

STATUS LINE ROUTINES BY ALGIE GRAY

This idea was working within 15 minutes and a rewrite for Atari Basic, from the original Turbo Basic, is presented here.

Demonstration

Lines 1 to 175 are basically just to demonstrate the use of the subroutines. However, in line 100 the string variable SL$ is dimensioned to 80 characters. SL$ will be used hold any information to be printed to the status line.

Initializing the Status Line

Lines 9000 to 9160 contain the subroutine to initialise the status line.

Line 9030 reserves and protects two pages of memory, for our purposes, above RAMTOP. Locations 106 and 740 both contain the number of pages (256 bytes) of memory available to the computer at powerup. By reducing the number held in location 106 by 2 the computer is fooled into thinking that the last two pages of memory do not exist. I have reserved two pages for a

Line 9150 effectively turns on the status line. Locations 560 and 561 are examined by the ANTIC chip to find the starting address of the display list. By poking the address of our custom display into these locations ANTIC will use our display list.

Printing to the Status Line

Lines 9500 to 9600 contain the subroutine to print information to the status line.

Line 9530 checks locations 88 and 89 which contain the address of the start of the screen memory (the top left corner, TLC) in Hi-byte, Low-byte format. This information is used by the system to PRINT to the screen. The values presently in these locations are saved into the variables TLC1 and TLC2.

Line 9540 resets the screen margins to cover all 40 columns. If you are using different margins you will need to handle restoring your own values.

Display List Data

Lines 9990 to 9994 contain the data for the CDL. I do not intend to run through the total of instructions contained in display lists as there are numerous and better descriptions available elsewhere. I shall however breifly explain each element in our custom list.

There are 37 elements in the custom list. The first element, 112, is an ANTIC instruction to display eight blank scan lines. The second and third elements are instructions to display one blank line. This effectively gives a border of 10 blank scan lines at the top of the screen. A normal GRAPHICS 0 screen has three 112 instructions or 24 blank scan lines. This is where most of the space for the extra two status lines is found.

The forth element, 66, is a kind of composite instruction. It is made up of a 64 and a 2 (64+2=66). The 64 tells ANTIC that the next two elements will contain an address to start finding

screen information and the 2 tells ANTIC that the first screen line of this information should be displayed as a GRAPHICS 0 line. The fifth and sixth elements in the data are dummies. The address information is set by lines 9120 and 9130 and ANTIC is directed to 50 bytes after the CDL to find the screen information. The seventh element is the instruction 2 on its own, to display the next screen line in GRAPHICS 0 format. The eighth element is not a dummy but another instruction to display one blank scan line. These first eight elements of the custom diplay list effectively define the status line.

Element nine is another composite 64 and 2 and the data for elements ten and eleven are again dummies. The correct values of these elements are set by lines 9100 and 9110 to point to the beginning of the normal 24 line screen memory. The next 23 elements are the ANTIC instructions, 2, to display GRAPHIC 0 lines. Finally there is a 65 instruction. This tells ANTIC to jump to the address contained in the next two bytes and re-execute the display list, i.e. it points ANTIC back to the start of the display list and for our CDL this is the start of the last page of memory. The elements of address information following are again dummies and line 9140 inserts the correct information into the CDL.

The program provided really is the bare bones and is intended for inclusion in your own projects. Turbo Basic programmers may wish to reinstate the original DPEEK and DPOKES. Please note that you can turn off the status line with any GRAPHICS command and back on again by the commands in line 9150.

It must be remembered that we are cheating the system into displaying two more GRAPHICS 0 lines than it wants. I have tested the routine on a portable television and a composite green screen monitor and it is reasonably stable on both of these. Only the green screen rolled once during initialisation (and this disappeared when using Turbo Basic.) I would be interested to know if non-PAL systems have problems. [None appeared when Bob Woolley reviewed the program. ed.] There may also be a loss of screen stability during disk accessing, but unless you intend to constantly use the disk drive this should not be a problem. This also seems to disappear with Turbo Basic.

Well, that is about it. Hope you find this of some use. If anyone would like to exchange programming hints and tips please write to me.

Algie Gray
47 Buchanan Gardens
Kensal Rise
London NW10 5AD
England

```
1 REM *****************************          9040 DL=(PEEK(106)+1)*256
2 REM *                           *          9050 GRAPHICS 0
3 REM *    STATUS LINE SUBROUTINES *          9060 FOR N=0 TO 36
4 REM *           by              *          9070 READ D
5 REM *        Algie Gray         *          9080 POKE DL+N,D
6 REM *                           *          9090 NEXT N
7 REM *    For Atari Classic 1993 *          9100 POKE DL+9,PEEK(88)
8 REM *                           *          9110 POKE DL+10,PEEK(89)
9 REM *****************************          9120 POKE DL+4,DL/256
100 DIM SL$(80)                               9130 POKE DL+5,50
105 GOSUB 9000                                9140 POKE DL+35,DL/256
110 SL$=" THESE TOP TWO LINES ARE TO"         9150 POKE 561,DL/256:POKE 560,0
115 SL$(28)="TALLY IMMUNE    TO SCRO"         9160 RETURN
120 SL$(51)="LLING. PRESS A KEY TO L"         9500 REM ***************************
125 SL$(74)="IST.    "                        9510 REM *   PRINT TO STATUS LINE   *
130 GOSUB 9500                                9520 REM ***************************
135 POKE 764,255                              9530 TLC1=PEEK(88):TLC2=PEEK(89)
140 IF PEEK(764)=255 THEN GOTO 140            9540 POKE 82,0:POKE 83,40
145 LIST :FOR N=1 TO 1000:NEXT N              9550 POKE 88,DL/256:POKE 89,50
150 SL$=" AND THAT IS ALL THERE IS T"         9560 ? CHR$(125):POSITION 0,0
155 SL$(28)="O IT.  HOPE    THAT YOU "        9570 ? SL$
160 SL$(51)="FIND THESE SUBROUTINES "         9580 POKE 88,TLC1:POKE 89,TLC2
165 SL$(74)="HANDY. "                         9590 ? CHR$(125):POSITION 0,0
170 GOSUB 9500                                9600 RETURN
175 END                                       9990 REM ***************************
9000 REM ***************************          9991 DATA 112,0,0,66,0,0,2,0,66,0,0
9010 REM *  SET UP THE STATUS LINE  *         9992 DATA 2,2,2,2,2,2,2,2,2,2,2,2,2
9020 REM ***************************          9993 DATA 2,2,2,2,2,2,2,2,2,2,65,0,0
9030 POKE 106,PEEK(740)-2                      9994 REM ***************************
```

Are You A USER? — You CAN Get Help!

The North West Phoenix Atari Connection users' group recently sent letters to 90 other groups in an effort to update their newsletter exchange. The following list is a combination of those user groups that responded; 8-Bit groups that exchange newsletters with the San Leandro Computer Club; and all the groups listed in *Feedback*, the newsletter of the Adelaide Atari Computer Club. Some groups have "?" for computers supported. We believe those North American groups support both 8-Bit and ST users. We don't know which computers are supported by the Australian groups. You are encouraged to send additions and corrections to "You Big Dummies" at AC.

North American User Groups

Alamo Area Atari User Association
AAAUA
Russell Stowe, President
P.O. Box 79-1426
San Antonio, TX, 78279-1426
8-Bit

Atari Bay Area Computer Users Society
ABACUS
Roger Sinasohn, President
P.O. Box 22212
San Francisco, CA, 94122
8-Bit, ST, IBM

Atari Exchange of Louisville
AEL
Jan Wilt, President
P.O. Box 34183
Louisville, KY, 40232
8-Bit, ST

Diablo Valley Atari Computer Enthusiasts
DACE
Daniel Galant, President
2834 Rockridge Drive
Pleasant Hill, CA, 94523
8-Bit, ST

Front Range Atari Users' Group
FRAUG
Joseph Michaud, President
3012 Rockborough Court
Fort Collins, CO, 80525
8-Bit, ST

Garden City Atari Computer Enthusiasts
1003 Amphion Street
Victoria, B.C., V85 4G2
8-Bit, ST

Houston Atari Computer Enthusiasts
HACE
Bill Anderson, President
P.O. Box 820335
Houston, TX, 77282-0335
8-Bit, ST

Huntsville Atari Users Group
HAUG
3911 West Crestview
Huntsville, AL, 35816
?

Indiana-Michigan Atari Group Exchange
IMAGE
P.O. Box 1742
South Bend, IN, 46634-1742
8-Bit, ST

Jersey Atari Computer Society (?)
JACS
818 Drexel Street
Delran, NJ, 08075
?

L.C.A.C.E.
L.C.A.C.E.
P.O. Box 8788
Waukegan, IL, 60079-8788
8-Bit, ST

Miami Valley Atari Computer Enthusiasts
M.V.A.C.E.
P.O. Box 24221
Huber Heights, OH, 45424
8-Bit, ST, IBM, Mac

Noah 8
3632 W. 130th Street
Cleveland, OH, 44111
8-Bit, ST

North West Phoenix Atari Connection
N.W.P.A.C.
Dale Wooster, President
P.O. Box 67511
Phoenix, AZ, 85082
8-Bit

Ol' Hackers Atari User Group
Ol'HAUG
3376 Ocean Harbor Drive
Oceanside, NY, 11572
8-Bit

Pinellas Atari Computer Enthusiasts
PACE
Jean Brokaw, Editor
958 Phyllis Avenue
Largo, FL, 34641
8-Bit

S.P.A.C.E.
P.O. Box 120016
New Brighton, MN, 55112
8-Bit

San Diego Atari Computer Enthusiasts
S.D.A.C.E.
Paul Blagay, President
P.O. Box 900076
San Diego, CA, 92190
8-Bit, ST

San Leandro Computer Club
SLCC
Robbie Bridges, President
P.O. Box 1506
San Leandro, CA, 94577-0374
8-Bit, ST, IBM

Seattle Puget Sound Atari Computer Enthusiasts
S*P*A*C*E
John Strand, President
P.O. Box 11042
Tacoma, WA, 98411-0042
8-Bit, ST

Toronto Atari Federation
TAF
5334 Yonge Street, Suite 1527
Willowdale, ONT, M2N 6M2
?

Australian User Groups

Atari Computer Enthusiasts New South Wales
A.C.E. (N.S.W.)
Swavek Jabrzemski, President
G.P.O. Box 4514
Sydney, NSW, 2001
?

Adelaide Atari Computer Club
Neil Patterson, President
P.O. Box 333
Kent Town, SA, 5071
8-Bit, ST

Burnie Atari Computer Club
Alex Bienefelt
P.O. Box 99
Ridgley, TAS, 7321
?

Canberra Atari Users Group
Lindsay George, Convenor
P.O. Box 29
Lyons, A.C.T., 2606
?

Geelong Atari Users Group
Vic Fuller, President
P.O. Box 673
Geelong, VIC
?

Melbourne Atari Computer Enthusiasts
MACE
Brian Campbell, President
P.O. Box 340
Rosanna, VIC, 3084
?

Queensland Atari Computer Enthusiasts
Peter Peterson, President
P.O. Box 10026
Brisbane, OLD, 4000
?

W.A. Atari Computer Club
Paul Blackmore, President
19 Wandarrie Avenue
Yokine, W.A., 6060
?